May

[See Page 675]

15 Cents

POPULAR MECHANICS MAGAZINE

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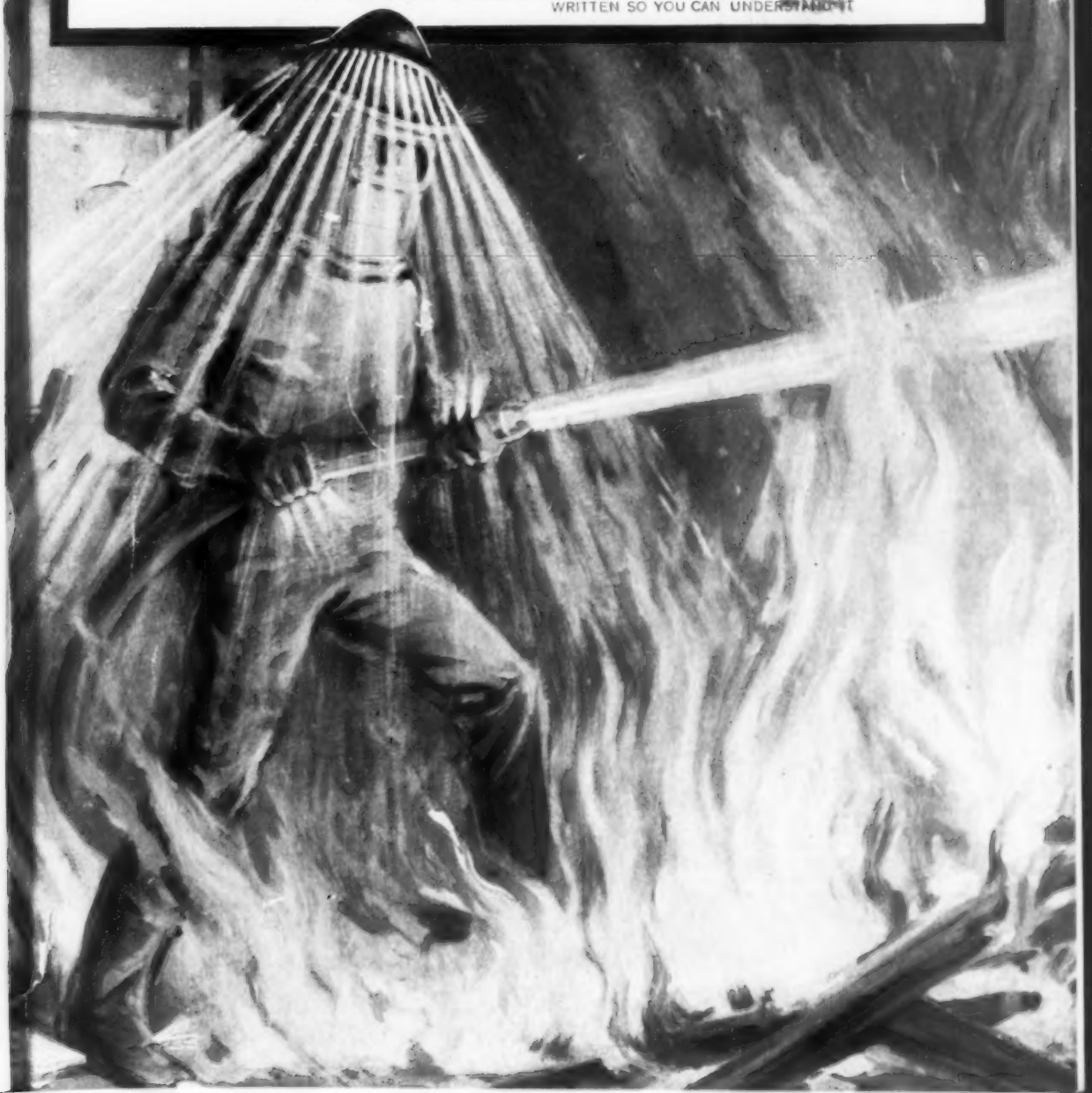

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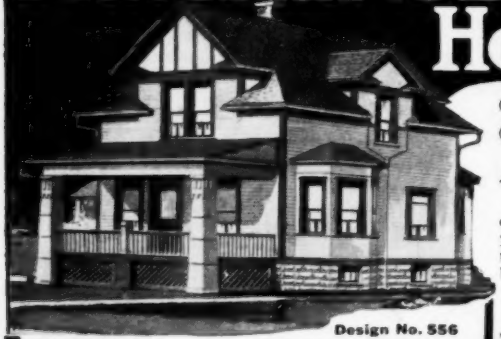

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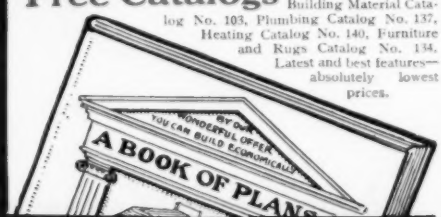

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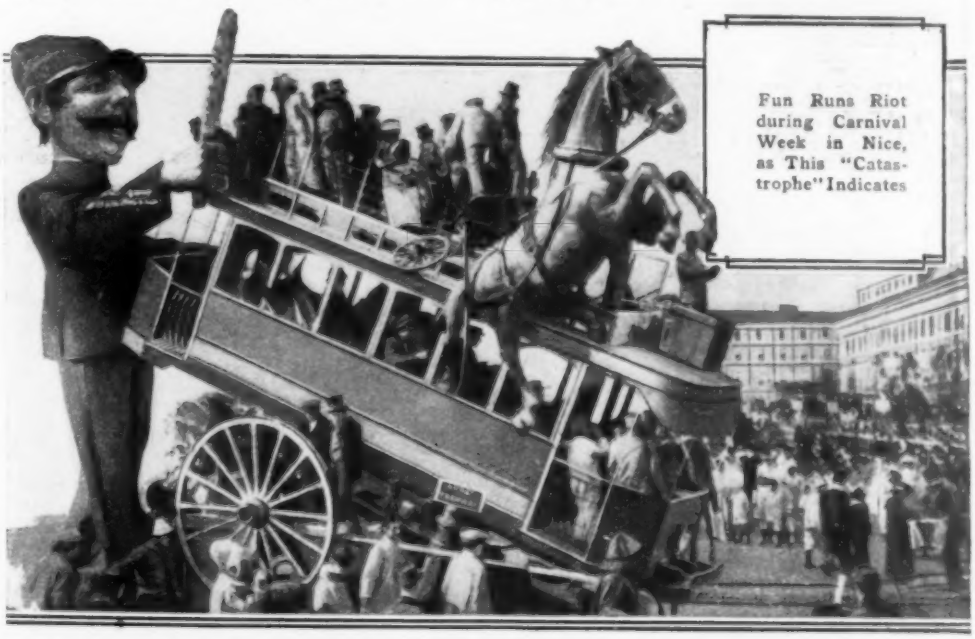
Popular Mechanics Magazine

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 21 MAY, 1914 No. 5

A Good Imitation of a General Smash-Up

THE carnival season at Nice, the famous pleasure resort of southern France, is one continuous round of hilarity. The city is decked in gala attire and tourists from every land throng the streets. The parades, which are a feature of the occasion, display floats, some sumptuous, some huge bouquets of blossoms, and some so mirth provoking that their progress through the streets is marked by waves of laughter. One of the most curious of these funny floats at the last carnival depicted an unusual collision between a street car and a horse cart, with the horse and cart poised upon the roof of the car, the frightened passengers in every posture of surprise and terror, and the horse plunging to disengage himself from the wreckage. At the rear, a gigantic gendarme or policeman lifts the end of the car, as if to release the horse. The horse is stuffed, the figures of the passengers mostly "dummies" from some clothing store, but the conductor and some of the passengers are real persons, who lend "action" to the piece by their movements.



Fun Runs Riot during Carnival Week in Nice, as This "Catastrophe" Indicates

Below is a signpost much seen on traffic streets in France, bearing the legend "Arrêt du Tramway," which is the equivalent of our signs "Street Cars Stop Here." Inasmuch as motormen in France, as in other countries, frequently neglect to stop where the sign is displayed, occasioning annoyance equal to that in similar cases on this side of the Atlantic, the addition of the signpost on the float provoked much merriment when it was hauled through the crowded streets.

RIFLE WITH BINOCULAR TELESCOPIC SIGHTS

A new rifle has been invented which the sportsman rests against his forehead instead of against his shoulder. Two telescopes form the sighting device, by means of which accurate shooting is possible at distances impossible with the usual type of gun. The inventor, an Ohio sportsman, in experimenting, used a gun having a range of about 1,500 yd. and a penetration of ⅜ in. of boiler steel. A binocular telescope of peculiar design is combined with the gun and makes it unnecessary to squint the eye in sighting. A padded plate shaped to the forehead is so arranged that the recoil of the shot is entirely taken up by flat springs. Rifle and telescope may be taken apart in a few minutes. The eyepieces of the binocular are easily adjusted to different widths between the eyes of individual users. The focusing of the telescope actuates the mechanism for raising or lowering the gun for different ranges in accordance with the focus.

Telescopic Rifle for Shooting Game at Long Range

MANILA HARBOR TO BE DEEPENED

The inner harbor at Manila is to be deepened to 32 ft. at low tide, the government having bought a huge suction dredge with a capacity of 1,000 cu. yd. per hour for that purpose. A difference of 5 ft. between high and low tide in the harbor makes it possible for the mammoth freighter, "Minnesota," the largest ship navigating the Pacific, heavily loaded, to dock at the government piers, as after the deepening of the harbor 37 ft. will be provided. At present work is being done nearest the piers, where the churning of the screw propellers has accumulated much mud, making navigation difficult and rendering the docking of large vessels almost impossible. After the Manila job is completed the dredge will be sent to Iloilo to deepen the harbor there.

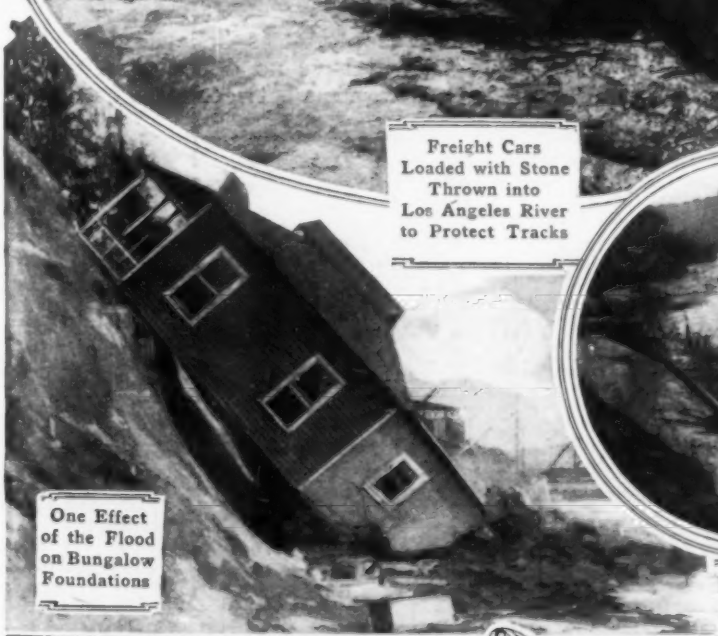
RESULTS OF THE FLOOD IN LOS ANGELES

When a most unusual rainfall occurred on the slopes of the Sierra Madre range in southern California recently, the flood swept down the Los Angeles River, and transformed the Arroyo Seco, a dry ravine, into a torrential watercourse, spreading wreck and ruin to the very edge of San Pedro Bay. The rush of waters ate its way into the banks of sand and loam, toppling houses to destruction, fortunately with little or no loss of life. In an effort to prevent the Los Angeles River from cutting away its tracks, one railroad company dumped 10 freight cars, heavily loaded with rock, down the bank at Macy Street. After a brief period of flood, the waters subsided almost as rapidly as they rose, leaving a trail of wreckage totaling many thousands of dollars.

An Orchard Washed Out by the Torrent

Many Dwellings were Destroyed by the Rushing Waters in the Los Angeles Flood

Freight Cars Loaded with Stone Thrown into Los Angeles River to Protect Tracks



One Effect of the Flood on Bungalow Foundations

A Curious Effect of the Flood

CIRCUS PERFORMERS HANG BY THEIR HAIR

A remarkable feat was accomplished by two members of a troupe of Chinese performers in a circus, ex-

Novel Stunt by Chinese Circus Performers

hibiting in Berlin recently, when hooks connected with ropes swung from the flies were caught in their queues, lifting the performers, the table at which they sat and their chairs high in the air. Here they swung, all the while calmly drinking, for several minutes.

TUNGSTEN LARGELY USED IN ELECTRICITY

Although the commercial use of tungsten is so recent that it is barely mentioned in most textbooks, it already has an important place in the electrical industry. It has been found advantageous to use tungsten in the targets of X-ray tubes, on account of its high melting point, 3100° Centigrade, which enables it to withstand the terrific bombardment of the cathode rays, and the consequent high temperatures attained in modern high-speed skiagraphy. In electric furnaces tungsten is used both in strips for winding coils and in tubes. Automobile manufacturers are using more and more of it for sparking points, and some are even adopting tungsten for all electrical contacts. In the form of gauze, tungsten is highly efficient for separating solids from acid baths, as the metal is insoluble in most common acids. Tungsten is slightly heavier than gold, and its use as an alloy for steel is well known, as also is its household usage as a filament for incandescent lamps.

CAPE-CAIRO CAR CARRIES LARGE GASOLINE SUPPLY

The automobile in which representatives of the Belgian government are to ride from the Cape of Good Hope to Cairo, in the transafrican trip, is equipped with two tanks, one on either side, at the front end of the running board. In these tanks 80 gal. of gasoline may be carried, auxiliary to the usual supply tank at the rear. With this supply, it is believed the 16-hp. car will have no difficulty in making the long runs between stations.

How an Extra Supply of Gasoline is Carried for Long Journey

The First of Forty Electric Locomotives being Shipped to Colon

ELECTRIC LOCOMOTIVES IN TRANSIT TO PANAMA

Marking the last stages in the completion of the Panama Canal, 40 electric locomotives which are to tow the vessels through the locks, are now being shipped to the Canal Zone. These "electric mules," as they are called, weigh 50 tons each, and demonstrate amazing power when installed upon proper tracks. The towing lines are wire ropes, each 400 ft. long, and four locomotives will be used for each vessel at each lock, two hauling on ropes attached to the bow and two at the stern, to steady it. These wire ropes are an inch in diameter and are composed of six strands of high-tension wire around a hemp core. The specifications call for a breaking strength of 37 tons each, and tests show a strength of more than 10 per cent in excess of that called for in the specifications.

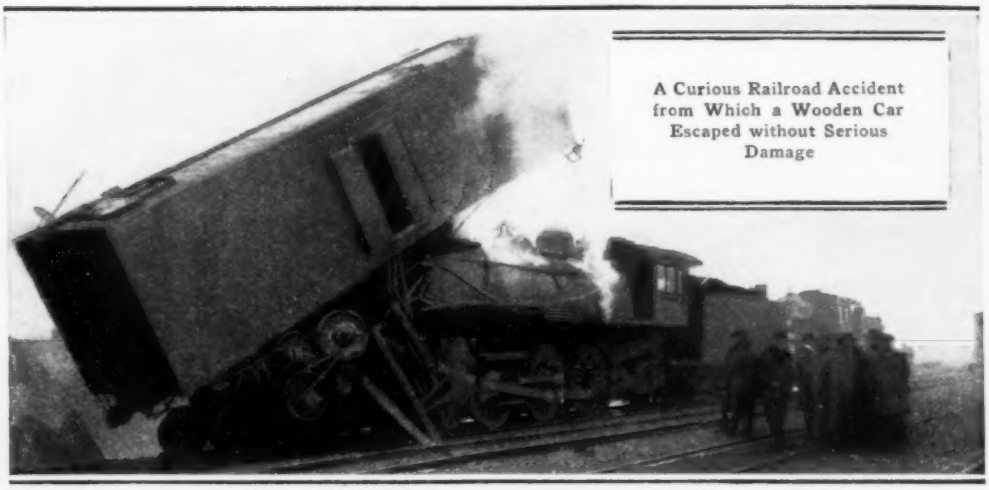
¶A trolley line is to be built from Jerusalem to Bethlehem, a concession having been granted by the Turkish government to a French banking firm. At the same time electric current will be used to light the city of Jerusalem.

RUBBER SKATES NOW PART OF SOLDIERS' KIT

Experiments have been carried on by German military authorities with a pair of cigar-shaped foot pontoons, or skates, made of rubber, by which it is believed a soldier may be equipped to walk across rivers, carry heavy loads on the water, and fire his rifle with as much steadiness as on land. The device is about 6 ft. long, and is fastened on the foot like a snowshoe. The motion resembles skating rather

Courtesy India Rubber World

German Soldier Equipped with Rubber Skates



A Curious Railroad Accident from Which a Wooden Car Escaped without Serious Damage

than walking, and because of this the name of rubber skates or water skates has been given the device. A number of these skates fastened together make a very serviceable raft, or they may be used as a basis for a pontoon bridge.

MEDAL OF HONOR GIVEN TO COLONEL GOETHALS

In appreciation of the distinguished services rendered to the nation by Col. George W. Goethals as Chief Engineer of the Panama Canal, a gold medal was presented to him by the Civic Forum of New York, on March 4th, last. The presentation was made by the head of the New York state department of education, in the presence of army and navy officials of the highest rank, national, state and city dignitaries, and an immense audience.

COLLISION POISES CAR ON SMOKESTACK

A curious railroad wreck occurred in Chicago recently, when a special train on one road struck a freight train on another at a crossing. Both trains were moving, and the freight was struck near the middle. One car was lifted on the locomotive of the speeding special, and carried quite a distance down the track, nicely balanced on the smokestack. An interesting phase of the accident is the fact that the car was a wooden one and was not materially damaged by its adventure.

NEW VARIETY OF COTTON IN EGYPT

A new cotton has been developed in Egypt which is said to be stronger than any variety heretofore produced in that country. Careful selection of seed, and particular attention to securing the best plants of each successive growth, after the best modern agricultural practice, is responsible for the long fiber and the silky texture. The plants are short and are covered with bolls, as many as a hundred having been found on a single plant. The cotton is brown in color, and its superior strength, together with its abundant bearing, makes it a most valuable addition to this important family.

German Soldier Equipped with Rubber Skates

CALIFORNIA TO FORM A MILITIA AERO CORPS

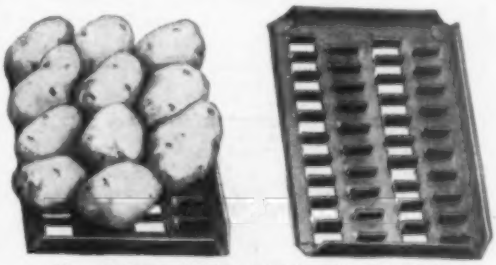
The second state to enlist men in a militia aero corps is California, New York having previously recognized this arm of the service by a duly organized body of fliers. A recruiting office has been opened in Los Angeles where enlistments for the latest branch of the state-militia organization are being received. The corps will be recruited to a full strength of 39 men and five officers. Its first equipment will be two machines with automobile tenders, which will be augmented later to four machines, each with an auto tender. The aeroplanes will be regular two-passenger scout machines, and will be equipped with wireless, if experiments now being conducted prove the feasibility of the idea.

UNSINKABLE LIFEBOAT HAS NOVEL FEATURES

Recently an English inventor exhibited upon the Thames a lifeboat which is claimed to be unsinkable. It is a cylinder, pointed at both ends, with sliding doors which may be tightly battened, and affords a refuge in emergency for 80 people. This strange-looking craft may be launched in a few seconds, according to the inventor, and is buoyant in the extreme, carrying its large load easily and safely in a heavy sea. Air is supplied to the interior by means of a small pump.

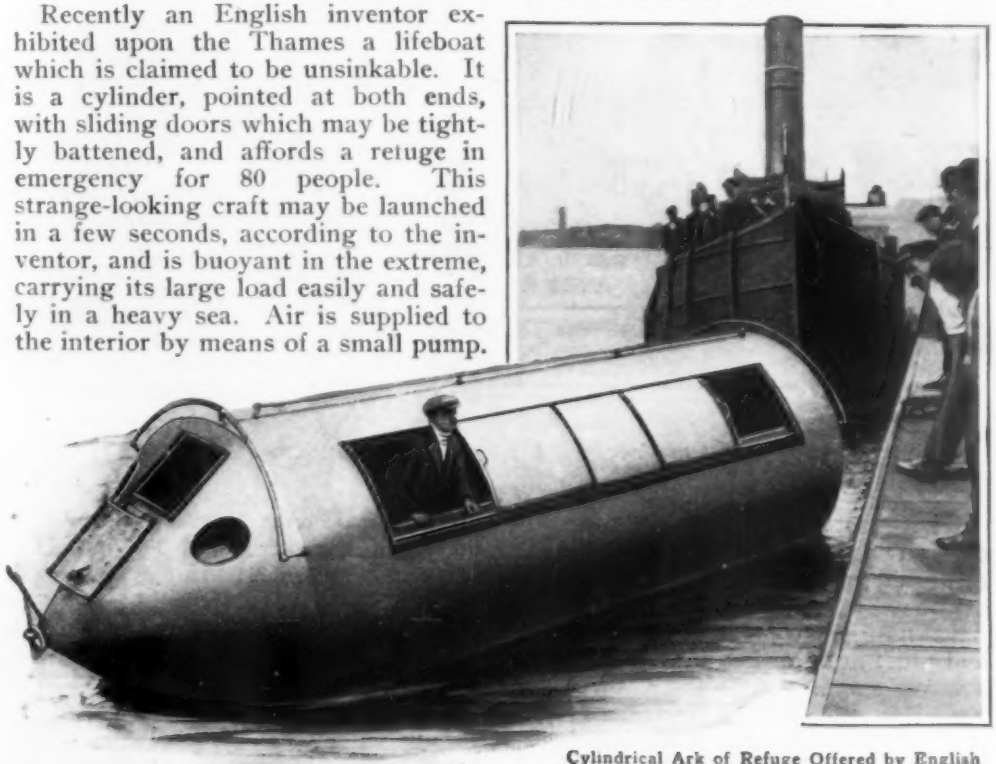
NEW DEVICE FOR BAKING POTATOES

A potato baker recently placed on the market consists of a bottomless pan having a gratelike top on which



New Baker with Metal Strips That Hold the Potatoes in Place

the potatoes are laid. At the edges of the openings are upright metal strips which serve to hold the potatoes in place and prevent them from rolling together, while the openings permit a free circulation of hot air for baking. This device is designed to be used in an oven.



Cylindrical Ark of Refuge Offered by English Inventor as Nonsinkable Lifeboat

Erecting Floor of the Manhattan Bridge over East River, between New York City and Brooklyn. The Floor is Built Out from the Towers and Secured, Piece by Piece, to the Heavy Steel Bars Suspended from the Main Cables. This is the Newest of the Bridges Connecting Manhattan Island with the Borough of Brooklyn. It Crosses North of the Old Brooklyn Bridge and below the Williamsburg Bridge. The Photograph, Taken from the Brooklyn Side, Shows Manhattan in the Distance

Copyrighted by Irving Underhill

LAYING THE FLOOR OF A SUSPENSION BRIDGE

The most interesting and dangerous-looking stage in the construction of a suspension bridge is the building of the floor. In this work the builders have nothing to rest their work on and must build out each way from the towers, securing the floor, piece by piece, to the heavy steel bars suspended from the main cables far above. The work is done with derricks that are equipped with booms long enough to reach out ahead of the finished structure and hold the girders suspended while they are being riveted in place. As each section of the floor is completed, the derricks are moved ahead and the construction of the next section is begun. The sagging of the completed portion of the floor, which may be detected in the accompanying

illustration of the new Manhattan bridge at New York City, is caused by the unbalanced weight of the structure, which pulls the main cables down slightly in the vicinity of the towers. With the entire floor in place, the weight is evenly distributed and the cables take the catenary curve intended by the engineers.

¶The Japanese are making waterproof boots, shoes, bags, and trunks from the tanned hides of sea lions.

PROTECTION AGAINST HIGH-POWER LINES

Where high-power transmission lines cross roadways there is always present the possibility that stress of wind or sleet will break the cable and endanger travelers. To safeguard the lives of those using the roadway, the aluminum cables which transmit 170,000 kw. from the power station to the nitrogen factories at Saaheim, Norway, have arched supports built over the road wherever

the transmission lines cross. These wire networks could scarcely be supposed to prevent the highly charged cables, entirely uninsulated, from burning through the slight screen, but it is believed that such resistance would be offered as would permit the escape of whoever might be underneath when the cable broke.

Safeguarding the Traveler on Norwegian Roads

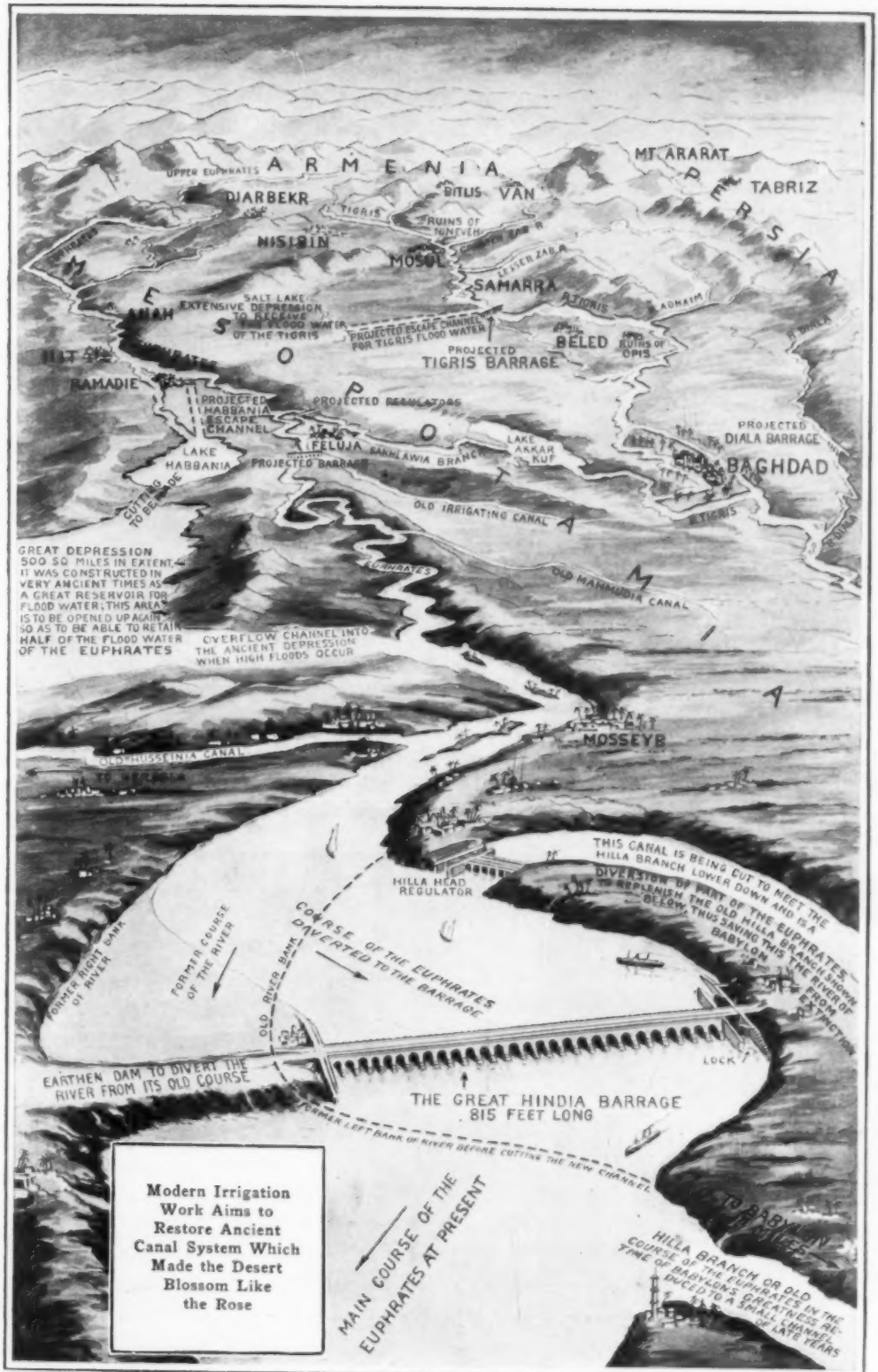
¶ Florida buttonwood is highly prized for cooking on ships, as it burns slowly with an even heat and makes little smoke or ash.

NEW AEROPLANE CONTROL LESS TIRESOME

After five years of lever control, by which both hands of the pilot were continuously engaged in manipulating the forward and backward movements of the warping and turning mechanisms, the makers of the Wright aeroplanes have now adopted the automobile type of steering wheel. The lever system proved in practice, after it had been once mastered, a very precise method, but in long-distance flights operators found it exceedingly tiresome. The new control, which has been quite generally adopted in Europe, is termed "instinctive," as the movement forward and back of the steering wheel falls in with the natural movements of the body in accommodating one's self to upward and downward motions of the aeroplane. The wheel also is utilized for turning, banking and wheeling, the rudder being actuated by partially revolving the wheel, as in steering an automobile.

IRRIGATION TO RESTORE GARDEN OF EDEN

Lying between the Euphrates and the Tigris Rivers is today a desert where once was fertility so abundant that it passed into a proverb; Mesopotamia, the land was called, and here, "Between the Rivers," as the name may be translated, was the traditional location of the Garden of Eden, the original home of the human race. Huge irrigation works, of which the great Nahrwan Canal, and its counterpart, the Dijail, are still traceable, brought the waters of the Tigris to the fields of grain, two thousand years ago. But these and other great works perished and were swallowed up in the shifting sands long centuries since. Recently, under the direction of an eminent English engineer, the Turkish government has built a dam, or barrage, across the Euphrates, 14 miles above Babylon, as the first step in a vast scheme of irrigation to redeem half a million acres, transforming the desert into a garden spot. The barrage will divert the course of the Euphrates into canals, from which the water will be distributed over a vast territory of


ARMENIA
MT. ARARAT
PERSIA
TABRIZ
UPPER EUPHRATES
DIARBEKR
BITLIS
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R. TIGRIS
RUINS OF NINEVEH
NISIBIN
MOSUL
LESSER ZAB R.
SAMARRA
R. TIGRIS
ADHAIM
R. DIALA
SALT LAKE
EXTENSIVE DEPRESSION TO RECEIVE THE FLOOD WATER OF THE TIGRIS
PROJECTED ESCAPE CHANNEL FOR TIGRIS FLOOD WATER
BELED
RUINS OF OPIS
PROJECTED TIGRIS BARRAGE
RAMADIE
PROJECTED HABBANIA ESCAPE CHANNEL
PROJECTED REGULATORS
FELUJA
LAKE HABBANIA
PROJECTED BARRAGE
SAKHLAWIA BRANCH
LAKE AKKAR KUF
PROJECTED DIALA BARRAGE
BAGHDAD
OLD IRRIGATING CANAL
CUTTING TO BE MADE
GREAT DEPRESSION 500 SQ. MILES IN EXTENT. IT WAS CONSTRUCTED IN VERY ANCIENT TIMES AS A GREAT RESERVOIR FOR FLOOD WATER; THIS AREA IS TO BE OPENED UP AGAIN SO AS TO BE ABLE TO RETAIN HALF OF THE FLOOD WATER OF THE EUPHRATES
OVERFLOW CHANNEL INTO THE ANCIENT DEPRESSION WHEN HIGH FLOODS OCCUR
OLD MAHMUDIA CANAL
MESOPOTAMIA
MOSSEYB
OLD HUSSEINIA CANAL
THIS CANAL IS BEING CUT TO MEET THE HILLA BRANCH LOWER DOWN AND IS A DIVERSION OF PART OF THE EUPHRATES TO REPLENISH THE OLD HILLA BRANCH SHOWN BELOW, THUS SAVING THIS PART OF THE RIVER FROM EXTINCTION
HILLA HEAD REGULATOR
BABYLON
FORMER RIGHT BANK OF RIVER
FORMER COURSE OF THE RIVER
COURSE OF THE EUPHRATES DIVERTED TO THE BARRAGE
OLD RIVER BANK
EARTHEN DAM TO DIVERT THE RIVER FROM ITS OLD COURSE
LOCK
THE GREAT HINDIA BARRAGE
815 FEET LONG
FORMER LEFT BANK OF RIVER BEFORE CUTTING THE NEW CHANNEL
TO BABYLON
HILLA BRANCH OR OLD COURSE OF THE EUPHRATES IN THE TIME OF BABYLON'S GREATNESS REDUCED TO A SMALL CHANNEL OF LATE YEARS
MAIN COURSE OF THE EUPHRATES AT PRESENT
Modern Irrigation Work Aims to Restore Ancient Canal System Which Made the Desert Blossom Like the Rose

Courtesy The Graphic

highly fertile farming country. Other river-conservation schemes are provided for in the full plans, which are designed to enable the government to conquer the Euphrates as it was mastered by the ancients. The Tigris is also included in the full project, which is estimated to cost in its entirety something like $75,000,000, though years must elapse before the whole scheme is worked out.

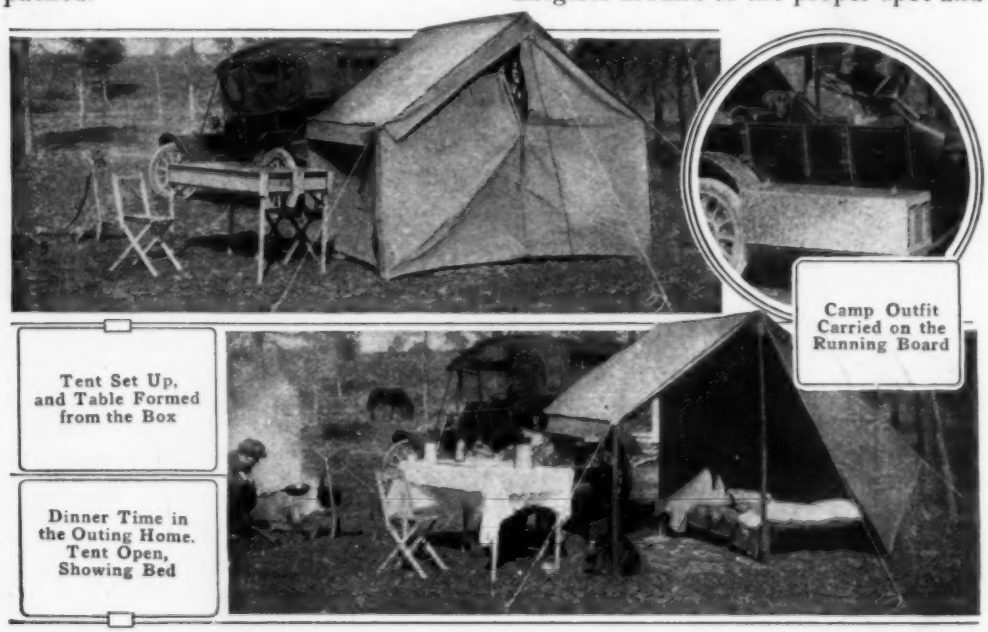
OUTING HOME CARRIED ON RUNNING BOARD

A portable camp outfit, carried in a neat box upon the running board of an automobile, or fastened behind the seat of a buggy or wagon, forms a complete outing home when set up. A folding spring bed of standard size is provided, which, when set up, affords substantial support for the framework of a tent, whose center pole is clamped to either end of the bed. One side of the canvas covering may be raised and supported to form a porch, while the box in which the outfit is packed forms a table. The case and outfit complete weigh 130 lb. and occupy a space of 10 by 16 by 48 in., packed.

"FAKING" A THRILLER FOR THE "MOVIES"

The thrilling scenes depicted upon the screen at the "movies," although the result of actual photographs, may not be always what they seem. A recently produced "movie" film shows a dare-devil detective using a dirigible to overtake an express train in which is riding, in fancied security, the criminal who seeks to escape him. The picture shows the detective climbing down a knotted rope from the dirigible to the roof of the speeding train. Few scenarios have called for a more hazardous feat. When shown upon the screen it is so realistic that the spectators involuntarily clutch at their chairs, scarcely breathing until the act is completed in safety.

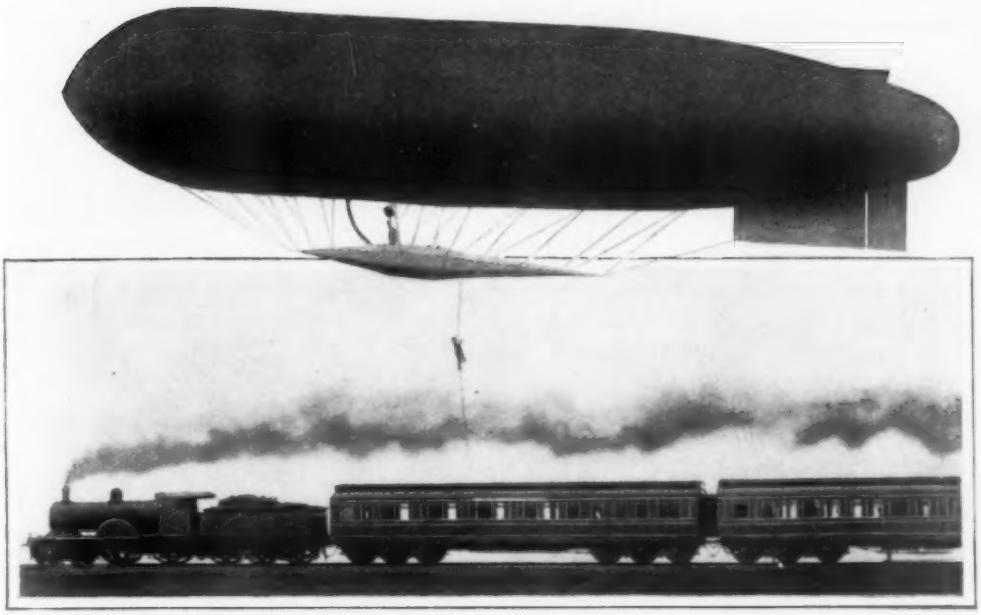
The making of this film, however, while it involved some risk, was not as hazardous as it appears. The owner of a little airship kept it at an aerodrome in England, alongside of which run the tracks of the Midland Railway. A moving-picture concern hired the airship and the owner took an acrobat with him, cruising about until he saw a train coming. Then he brought his dirigible around to the proper spot and



Camp Outfit Carried on the Running Board

Tent Set Up, and Table Formed from the Box

Dinner Time in the Outing Home. Tent Open, Showing Bed



A Real Incident in the Making of a Moving-Picture Film, Which is Only "Make-Believe" Made Possible by Cleverly Cutting Out a Gap in the Film between the Dirigible and the Train

waited for the train. The acrobat climbed down the knotted rope. Just as the train sped beneath, the moving-picture machine was started, and in a few seconds the scene was "filmed." As the dirigible owner considered it far too risky to bring the airship close down over the train, the film showed a large gap of sky between the tail of the rope and the roof of the train. So the gap was "cut out" and the film shows the man within a reasonable distance of the roof, in fact right in the steam and smoke.

The film people, not being satisfied with showing the man climbing down the rope, determined to show him actually alighting on the roof of a railway car. Unable to obtain permission from the English railway authorities to complete what they considered a good scene, they finished the film in France, where a more complaisant set of officials were found. The finished picture shows an English Hawkshaw climbing down from an English airship toward an obviously English train, and alighting on the top of an undeniably French railway carriage from a French dirigible!

Incidentally, airmen say that if a man did climb out of a dirigible and let go, the airship would shoot up to a height of several thousand feet before it could be brought under control. By turning the moving-picture shutters slowly when the picture is being taken and then turning the handle at normal speed when the film is being shown, a very slow train and an almost stationary dirigible can be made to give the effect of great speed on the screen.

AUSTRIAN INVENTORS FIND NEW WAY TO MAKE TEETH

Machines for casting artificial teeth of various metals have been open to objection in that uniform density could not be obtained, and defects developed owing to lack of proper control of pressure. Two Austrian engineers have lately constructed a device at Prague, which, it is claimed, eliminates such defects. The pressure is automatic, always uniform, and is exerted vertically, something heretofore regarded as impossible in casting the molten metals in such small molds.

MACHINE GUN ON ARMORED AEROPLANE

French military authorities are experimenting with the first armored army aeroplane, equipped with a

Latest Addition to the French Aerial Navy

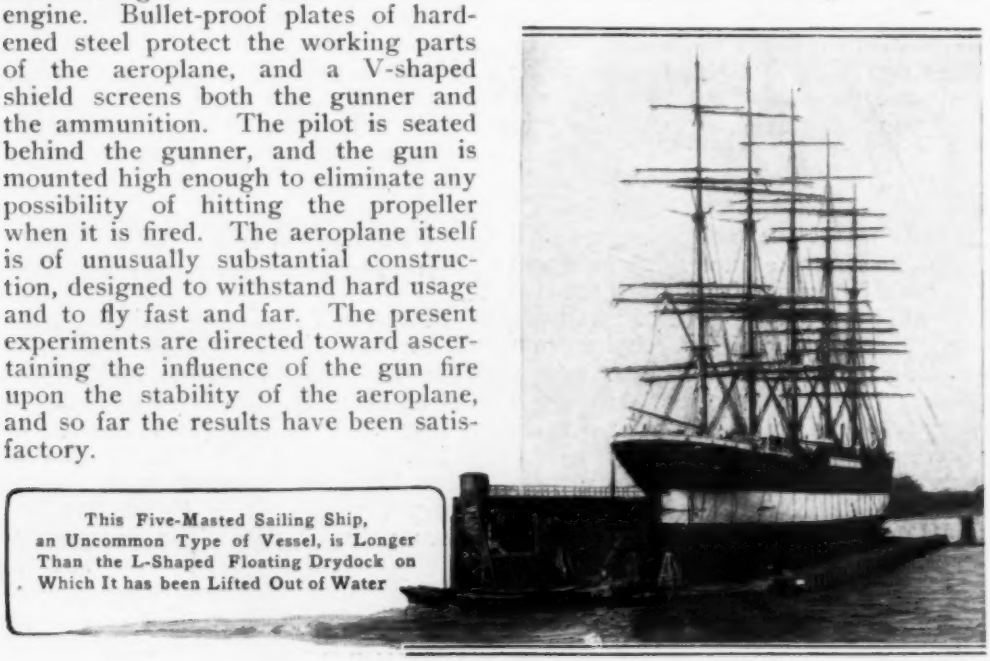
machine gun mounted over the engine. Bullet-proof plates of hardened steel protect the working parts of the aeroplane, and a V-shaped shield screens both the gunner and the ammunition. The pilot is seated behind the gunner, and the gun is mounted high enough to eliminate any possibility of hitting the propeller when it is fired. The aeroplane itself is of unusually substantial construction, designed to withstand hard usage and to fly fast and far. The present experiments are directed toward ascertaining the influence of the gun fire upon the stability of the aeroplane, and so far the results have been satisfactory.

It is believed that the armored aeroplane equipped with machine guns will be the most formidable antagonist the military dirigible will have to face in the next great war.

GREAT FLOATING DRYDOCKS IN GERMAN SHIPYARDS

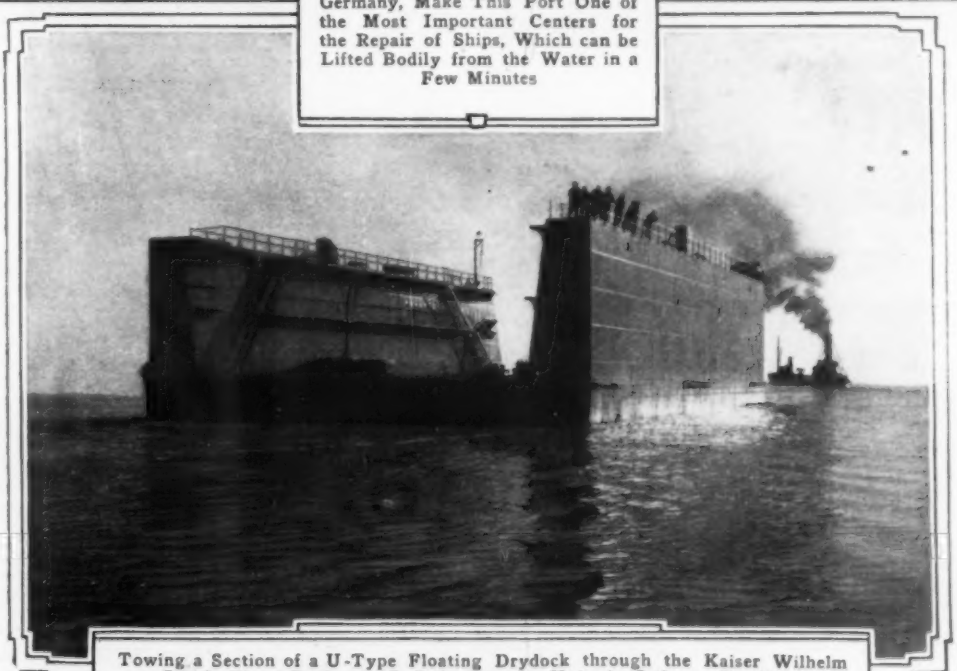
The latest floating drydocks in Hamburg Harbor show improvements in convenience and capacity over older installations. Not only is the size increasing, made necessary by the greater tonnage of the newer vessels, but the mechanical arrangements shorten the time required for docking the great vessels, and lighten the labors of the men employed in that arduous occupation.

These docks are of two designs, the "L" and the "U" types, as they are called, both of which have the decided advantage of permitting the docking of ships whose length greatly exceeds that of the dock. For instance, in a 280-ft. dock, the Hamburg steamer "Modestis" was docked, the vessel projecting 30 ft. fore and aft over the last keel blocks, while in exceptional cases



This Five-Masted Sailing Ship, an Uncommon Type of Vessel, is Longer Than the L-Shaped Floating Drydock on Which It has been Lifted Out of Water

The Floating Drydocks of Hamburg, Germany, Make This Port One of the Most Important Centers for the Repair of Ships, Which can be Lifted Bodily from the Water in a Few Minutes



Towing a Section of a U-Type Floating Drydock through the Kaiser Wilhelm Canal: These Docks are Built in Separate Units in Order to Facilitate Their Transportation from Port to Port

631

vessels 240 ft. longer than the dock have been handled. The floating drydocks are built in two or more sections, to facilitate towing through canals when it is desired to bring them to other ports. So powerful are the pumps with which these floating docks are equipped that it is but a matter of 40 or 50 minutes after the vessel is secured in its place that the dock has lifted it out of water, in shape for overhauling. Huge traveling cranes, capable of lifting 150 tons, are mounted on the sides of the drydocks. Jib and shear cranes of enormous lifting power may be erected at either end on the sides of the docks, so that the massive machinery with which the largest vessels are now equipped may be readily handled; great propeller shafts, monster boilers and gigantic engines may be removed, overhauled and again installed.

Large as are these newest floating drydocks of the great German port, already plans are being drawn for still larger ones, and so rapidly can they be built that, keeping pace with the construction of naval and commercial dreadnoughts, adequate drydock facilities, beyond anything now known, can be provided promptly.

REPLANTING THE FORESTS

The Forest Service of the United States, among its many activities, is engaged in replanting much timber in the national forests of the West. Near Colorado Springs, great areas were fire-swept some years ago. The soil is much eroded and a replanting scheme of considerable magnitude was projected. At Monument, a point on the mesa not far from Manitou, there is conducted a nursery. As soon as the

Carrying the Trees to the Planters

The Wavelike Rows in This Picture Show Where Tree Planting has been Done

Putting the Young Trees in Baskets for Transplanting

trees are ready for planting they are shipped to the forest station, where they are carefully separated, each young tree having its roots swathed in sacking. A number are then placed in wire baskets and carried on the backs of assistants up the mountain, where the individual trees are distributed to those in actual charge of the planting. The work is carefully done by expert tree planters, who cover a large area in a single day. This reforesting of Pike's Peak is the largest and most important project of the kind yet attempted by the Forest Service.

ENGLISH BOOTBLACK HAS A STRANGE CUSTOMER

A London tailor believes that the "dummy" upon which he exhibits his latest creations should have his boots blacked regularly, and has engaged a bootblack to shine the shoes every week. The spectacle is one which attracts the attention of every American who passes while the shoes

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Bootblack's Odd Customer Takes Weekly Shine

are being polished. A clerk holds the dummy upright while the bootblack performs the necessary operations.

MEXICAN LOOKOUT TOWER FOILS WATER THIEVES

A short distance southeast of Mexicali, Mexico, an irrigation ditch brings the water to reclaim half a million

Irrigation Ditch Guarded by Mexican Soldier

acres of the Imperial Valley. The water is taken from the Colorado River, on the Mexican side, and brought into California for use. Unscrupulous persons have been tempted to cut the dikes at night, or throw open gates, by which means great quantities of water might be diverted to other lands. The protection of this ditch falls upon the Mexican company which was formed in conjunction with the American corporation at the beginning of the project, and in order that water thieving may be reduced as far as possible, a watch tower has been built at the point where the water is measured out to the American company. This lookout tower is built of poles, thatched with arrow weed, and interwoven cane stalks form the sides. A notched log forms the stairway, and a uniformed Mexican guard stands in the doorway.

¶A toll road 20 miles long and costing $5,000 to the mile has just been completed in Texas.

SLIDING DOWN A MOUNTAIN NEW ALPINE SPORT

The latest Alpine sport is "volplaning" down a mountain railway in a little car resembling a steamer chair. The machine, which is called an Alpine aeroplane, is built of steel tubing, the steel supports gripping the rails, and controlled by a powerful brake operated by a side wheel. In front a windbrake, consisting of a square yard of steel plate, may be used as an additional speed control. Over 80 miles an hour has been made on this contrivance, which is fast becoming popular.

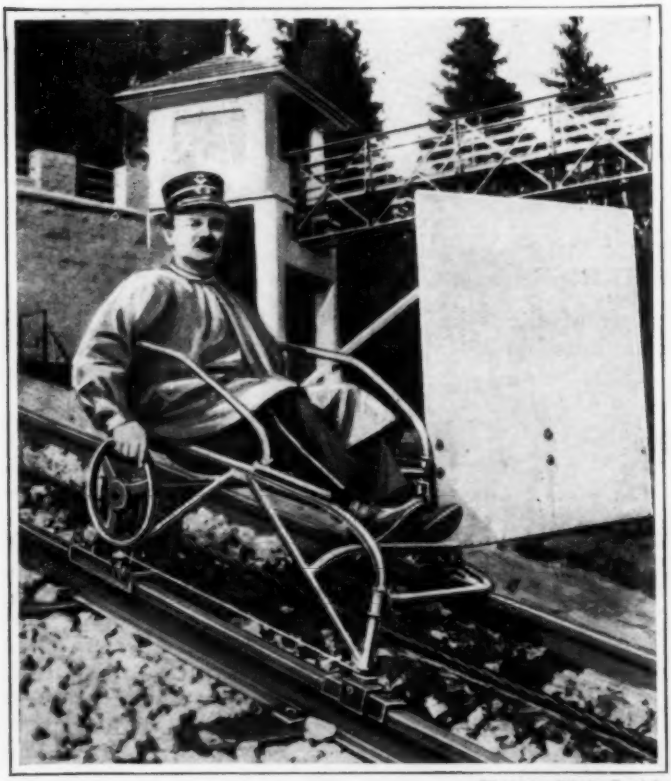


Photo by Edwin Levick
A Railroad Employe Volplaning Down an Inclined Railway

¶In replacing a railroad trestle recently burned along the north shore of Great Salt Lake, engineers found the piles perfectly sound after 43 years of service, due to the timbers being impregnated with salt from the lake.

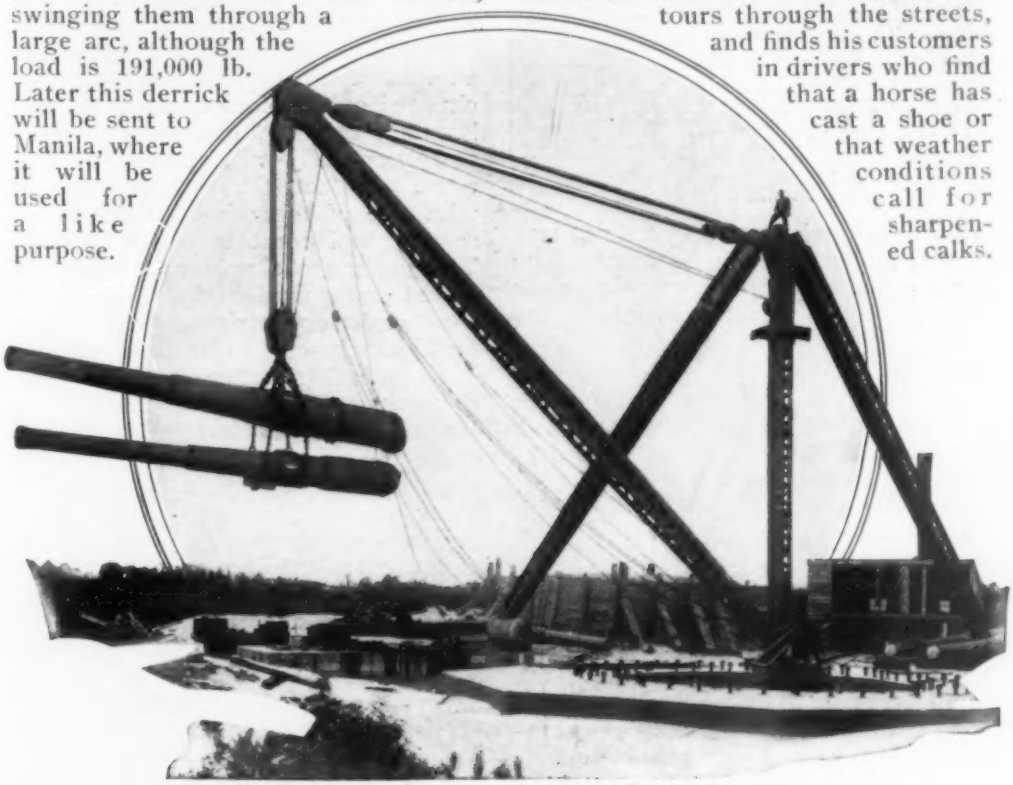
MEDALS THAT ARMY MEN MAY WEAR

The military decorations which may be worn by officers and enlisted men of the United States army and navy are strictly limited by orders of the War Department. Even honorary decorations presented to military attachés or visiting officers by foreign governments, may not be accepted nor worn except by an act of Congress. The Medal of Honor, granted for distinguished services by the authority of Congress, is the highest military decoration conferred in this country. Upon occasions of ceremony it is worn pendant from the neck, the ribbon passing between the upper and lower hooks of the coat collar, so that the medal hangs about an inch below the opening of the collar. The Certificate of Merit Badge, the medals commemorating the battle of Manila Bay, of various engagements in the West Indies, special meritorious medals for service during the war with Spain, other than in battle, and the Philippines Congressional medal are worn on the left breast of the coat, in a certain order of precedence. Life-saving medals of gold and silver issued by the Treasury Department, as well as good-conduct medals, and such insignia as airmen's and marksmen's badges, may also be worn in uniform. The badges of military societies, such as the Grand Army of the Republic, or societies commemorative of the wars of the United States, including the Philippine Insurrection and the China Relief Expedition and of the Regular Army

and Navy Union, corps and division badges of the Civil War and of the war with Spain, as well as that of the Enlisted Men's Abstinence League, are among the permissible decorations.

HOW THE GREAT GUNS ARE HOISTED

The huge rifle cannon which are designed to guard our coasts, to protect our harbors and to insure the workings of the Panama Canal in time of war, are of enormous weight, and placing them in position is no easy task. To handle these mammoth pieces, the derrick shown in the accompanying illustration has been built. Weighing over 80 tons, the derrick was first erected at the government proving grounds at Sandy Hook, where the guns are tested before they are dispatched to the coast fortifications for which they are designed. It lifts with ease two rifled cannon, swinging them through a large arc, although the load is 191,000 lb. Later this derrick will be sent to Manila, where it will be used for a like purpose.



Handling the Big Guns at the Government Proving Grounds

FARRIER PLIES HIS TRADE IN PARIS STREETS

On the streets of Paris is seen a portable smithy which does a profitable business during the winter. The farrier takes his tools with him on his tours through the streets, and finds his customers in drivers who find that a horse has cast a shoe or that weather conditions call for sharpened calks.

Copyrighted by Underwood & Underwood
A Street Horseshoer at Work in Paris

NOVEL BRACING FOR CONCRETE FORM

When a concrete retaining wall, 34 ft. high, was to be built in San Diego, the problem of bracing it strongly without

Ingenious Idea for Temporarily Bracing Retaining Wall

interfering with street traffic was solved by an ingenious scheme. The braces are made of 2 by 6-in. clear Oregon pine, which are sunk in the ground at the street level and fastened at the top to planks, one end of which is secured to stakes driven in the ground above the cut. Ordinary bracing could not be considered in this case, owing to the narrow space allotted. The wall when completed will be 700 ft. long.

BUREAU OF STANDARDS TO TEST WATCHES

Regular testing of watches for the public was inaugurated by the U. S. Bureau of Standards recently, thus taking up the testing and certification of watches in a similar manner to that carried on in the Kew observatory in England, the Besançon observatory in France and the Geneva and Neuchâtel observatories in Switzerland. Preliminary tests upon the various types and makes of American watches have already been made, the results of which have been the modification of European testing methods, and the establishment of certain standards of tolerances for practical service. The possession of a government certificate will enable the owner of a "certified watch" to know that he has a timepiece which conforms to the average and reasonable performances of high-grade adjusted watches. The fees for tests will merely cover the actual cost of the trials.

CONVERTIBLE TOOL HAS MANY USES

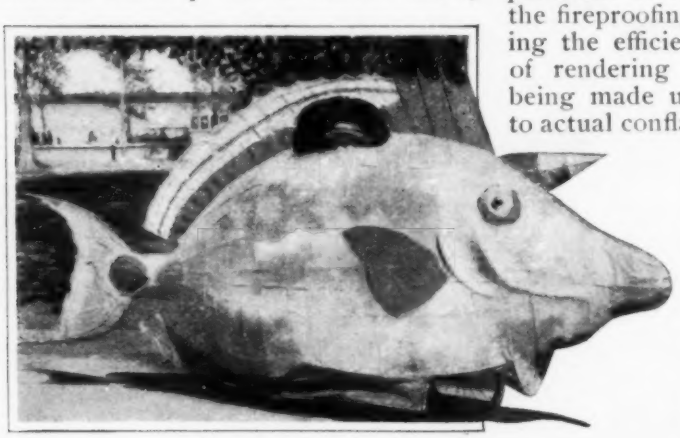
Twenty-two different implements may be constructed from the units of a combination tool recently invented by an Englishman. It is so constructed that it can be changed and interchanged quickly for service in mining, hunting, farming, camping, scouting, and practically all outdoor occupations. In fact, the pioneer equipped with one of these instruments has a regular tool chest in small compass. The parts are simple and easily renewed or repaired, and the absence of any weak or intricate parts, nuts, springs or screws to break or get lost is of advantage when far from cities or towns. Weighing less than 5 lb., constructed of tool steel and aluminum, and equipped with an insulating cover of soft rubber for use in handling live wires, the tool is found of service in the most diverse occupations. In the hands of a soldier, it may be used either for offense or defense; it may be used to chop down trees, dig trenches, cut, tighten or twist wire, even when the latter carries an electric current of high voltage, or as a screwdriver, pliers or can opener, as nail puller, nut key or wrench, spanner, pickax, or foot rule.

Shoeing a Horse
Used as a Cutter for Fence Wire
Practical Can Opener
As a Weapon of Offense and Defense
The Reversible Blade Makes an Adz
Tool of a Score of Uses and How It is Carried
As a File

New English Combination Tool in Use as a Trench Digger and Shield

BICYCLE FISH SEEN IN HAWAII

One of the curious floats seen in the parade during the floral festival in Hawaii recently was a canvas affair, brilliantly painted to represent one of the varieties of brightly colored fishes which abound in the waters about that island. The means of locomotion was an ordinary bicycle, as may be observed upon closely examining the picture. The head of the rider protrudes from a hole in the top.



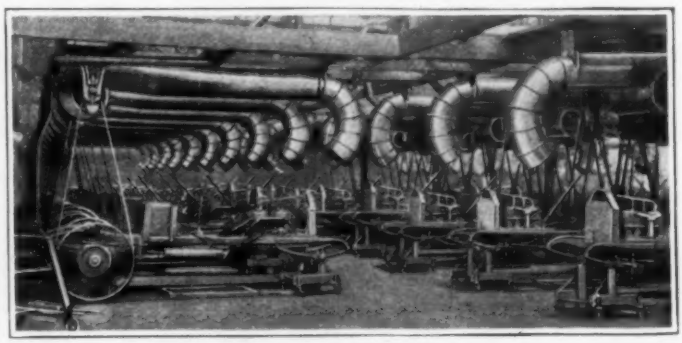
Novel Painted Float for Parade

GOVERNMENT EXPERTS SEEK FIREPROOF SHINGLES

At the Forest Products laboratory in Madison, Wis., experts of the Department of Agriculture are studying the fireproofing of wood. Tests showing the efficiency of various methods of rendering wood fire-resistant are being made under conditions as near to actual conflagrations as possible. An electric furnace is used, with a pilot flame of gas to simulate conditions usually existing in a fire. Woods of different kinds are dried, weighed, impregnated with metallic salts, and subjected to rigid tests in these investigations. Just now the work is being directed toward rendering shingles fireproof. While it is comparatively easy to force ammonia sulphate and ammonia phosphate into a shingle, rendering it very resistant to fire, the problem is complicated by the fact that shingles so treated must be exposed to sun and rain, and the salts are leached out.

AUTOMOBILE TESTING IN A MODERN PLANT

In one large automobile factory a curious method of testing the machinery previous to putting on the bodies is used. The motor and chassis are assembled complete with the exception of the wheels. In place of the rear wheels, two large pulleys are hung on the axle, and belts are run over them up to overhead fans. Pipes from these fans are led to the front of the chassis and curved downward so that air is blown down upon the motor, radiator and chassis. In this way the motor drives an actual load, accurately determined, similar to a road test, while at the same time it cools itself just as if it were speeding along the highway at 30 or 40 miles an hour.



Automobiles That Cool Themselves

COMMENT AND REVIEW

HUMAN life is valuable—some more than others, of course—but after all the great problem is how to get the most of real worth out of life. Some do not even try; they are, in business parlance, called "dubs." As the other extreme I know a man, a real worker, who actually begrudges every hour he is obliged to spend in sleep, because for want of time he cannot do nearly all the things he would like to accomplish. However, the men who do things in the world are those who conserve their time, and do not spend an hour at some task they can perform in twenty minutes. About the most worthless thing in human life, for years past, has been the time of a convict in our states' prisons. In spots they have been farmed out to contractors, and recently they have built some excellent roads—by far the most logical use of their time. Not all convicts, however, are qualified for that work, and little can be done on roads in winter, so at best there is a lot of time going to waste.

Prisons as Schools

Prisons and jails have been considered schools of crime, but the warden of the state penitentiary of Nebraska is trying to make his place a school in which to learn useful knowledge. A correspondence course has been established there, the studies including all the regular University of Nebraska educational extension work and all the common-school branches. The university remits all fees and gives regular credits for examinations. The experiment is promising thus far, and, in view of the splendid record of correspondence schools generally, Warden Fenton has every reason to believe results will fully justify his expectations.

FOR several years past airmen have hopefully looked to "next year" as the one in which the Atlantic Ocean would be crossed in a vehicle of the air. Each year has brought its disappointment; and while the feat will undoubtedly be accomplished some day, it seems unlikely that 1914 will be able to credit that milestone to its records. In some respects the event seems even farther off than three years ago. While experienced explorers are at this moment battling with untried routes in the Antarctic, none of them has either a dirigible or aeroplane in his outfit. They have air-propelled sledges, but no air craft.

Via Air to Europe

To the layman the dirigible, though slower in its movement than a plane vehicle, seemed the more likely to succeed; but the destruction of the Vaniman and several Zeppelins in mid-air has made him skeptical. At present the only suitable gas for the purpose is hydrogen, the explosive dangers of which are well known. It has even been questioned whether a dirigible may not, under conditions of very cold, dry air, by its own passage generate something in the nature of the pale blue flame sometimes seen in cold weather on fast-

moving belts. In which case a very small spark and a very minute gas leak would be as efficiently deadly as a thunderbolt. In aeroplanes, construction is stronger than three years ago, the power is greater and much more dependable, and long-flight records have been made. The Mediterranean has been spanned in flight; mountains with their great variety of atmospheric conditions have been crossed. However, as yet no airman has made a flight of 1,700 consecutive miles over water. To the innocent bystander, who is not supposed to know anything about flying, it would seem sensible, though commonplace, for some one to fly his machine 1,700 consecutive miles over some inland water, like Lake Erie, for example, before casting off the dock lines on a trip across the big pond.

In the opinion of Sir Hiram Maxim, the dirigible, in war at least, is a failure. He says: "We have come to the end of our tether in dirigible balloons; they are useless and practically impossible. It is nothing less than madness to sacrifice any more lives and treasure in attempting what is manifestly an impossibility."

Some day a vehicle will fly the gap; it may even be perfected in time to qualify for the $150,000 prize offered by the San Francisco Exposition for an around-the-world flight. However, the day, predicted by Kipling, when air craft landing inland will take New York as a port off the map may be considered as sufficiently remote to cause no immediate anxiety.

THE Safety-First movement has now spread over the entire country, and is gaining strength steadily. People are beginning to realize that certain specially hazardous occupations are not wholly fateful, and that hundreds of lives can, and already are being saved, through precautions easily taken. In a very large number of cases the result is accomplished by the workman himself; in others, by greater care on the part of those whose carelessness endangered not themselves, but some one else. We are beginning to recover from the speed mania which so long obsessed us, and to realize that the few minutes gained do not compensate for the risk involved; and that a dollar saved in faulty construction eventually costs a hundred when the crash comes. We are dull to learn; and schoolhouses, theaters and factories crushed or burned to death their hundreds, to save a few posts or the cost of a few more stairs or doors, before we learned the dreadful lesson.

Safety First

With more coal mines and miners than ever before, the safety precautions of the Bureau of Mines alone are saving as many lives as are rescued by all the life-saving crews on our entire seacoast. In many cities Safety-First Day is observed in the public schools, with addresses by experts from police and fire departments.

One of the interesting developments of the movement is the committee of one hundred, which is at work in one of our large cities. These men are carefully selected from among the leading business

and professional men of unquestioned standing, who themselves own motor cars. Their identity is known only to the appointing board. Their province is to report any flagrant violation of safe operation of automobiles and motor trucks which they personally observe. For example, a reckless driver speeds around a busy corner, missing a pedestrian by a few inches. A report is made out and sent in to the Safety Board, with details of time and place. A letter is sent the offender, politely calling attention to the offense, requesting greater care in future, and telling of the committee of one hundred. Usually this is sufficient; but if in a few days a second offense is reported, then a letter couched in stronger terms is sent, with the promise that a third offense will cause the three reports to be sent to the police department. This establishes a previous bad record if the offender is ever arrested, which seriously counts against him. Except in cases of certain absolutely reckless drivers — who sooner or later are bound to come to grief anyway — the cautionary letters, and the feeling that every car he passes may contain one of the unknown one hundred, serve to make the otherwise regardless driver much more careful. In London, when a chauffeur's license is issued, there is a space for entering a report of any previous arrest or accident which occurred to the applicant. I once saw such a license which contained a report of a collision the driver had five years previously. If he should have another accident, the police instantly get a line on his record by demanding his license, which must be carried when driving.

The above are only suggestions of perfectly simple, practical plans, which do not impose onerous restrictions or limitations on the law-abiding, but which apply the brake to the reckless.

Steam-Dried Hay

EACH year finds the farmer more of a mechanic, as machine after machine appears to take the place of the decreasing supply of manual labor. The up-to-date farm now has its machine shop and farmer machinist. The farmer complains that for five years past he has been obliged constantly to purchase new labor-saving machinery. On the other hand, had it not been for these new inventions, many would have been obliged to go out of business.

The latest thing is steam-cured hay, which makes the farmer independent of cloudy or rainy weather in haying time. The green grass is hauled to the hay factory, unloaded at one end of the plant and, 30 minutes later, emerges at the other end perfectly cured, ready for the barn or bale press. In case of rain, a canvas cover insures arrival at the barn without wetting. The farmer has about given up his time-honored trip to the "grist mill," and here comes the hay mill. Frequent showers make good grass, but much of this is ruined in the process of sun-drying. The steam drier is independent of weather, and moreover turns out a better product, and can work nights. Maud Muller might get a job checking the loads, but there isn't very much romance about watching the steam gauge and a lot of conveyor belts.

FIVE years of movies among the tough districts of New York's East Side has produced a very marked improvement. This is vouched for by Frederic C. Howe, director of the People's Institute, doubtless the most cosmopolitan platform in this country, and who also is chairman of the National Board of Censors who pass on the new films. All the best film producers voluntarily submit their new films to this board for approval before allowing them to go out to the public.

Movies a Civilizer

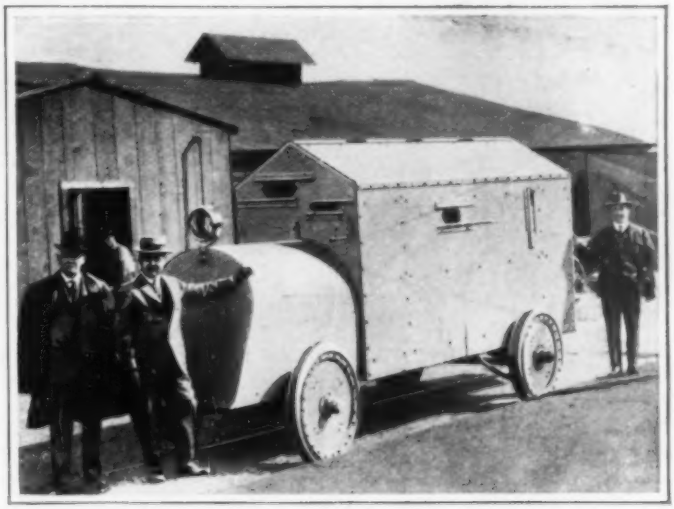
The movies have brought the world to the East Side—the great world of snow-capped mountains, sparkling brooks, great trees and beautiful flowers. It may be hot and stifling in the small, crowded room next the flat roof, but even the poorest may occasionally spare five cents for an hour in which mountain and lake are brought to those who have never been to either. So, too, the works of art from every land, noble buildings, mighty steamships and other great feats of engineering; statues of the world's great men; even the notable events of their lives, in which self-sacrifice and lofty ideals are reproduced, are seen and unconsciously absorbed. The dullest cannot fail to be aroused to some small stimulation of ambition or renewed effort at the swift, graphic story of what high-minded men and women have accomplished. And through it all runs the golden thread of the better things and better life, which inevitably elevates and broadens; for in every life, however narrow, there is some chord which must respond, be it ever so slightly, when the right key is touched.

Of all the inventions, of all the ages, not oratory—the ignorant cannot comprehend it; nor music—the deaf cannot hear it, the moving picture today doubtless possesses and can exert the largest, strongest, quickest influence. With many acknowledged defects, that influence is unquestionably one for good.

H. H. WINDSOR

ARMORED AUTOMOBILE FOR MEXICAN REBELS

An automobile of a curious type is that recently completed for the use of the "constitutionalist" army operating in northern Mexico. This car is completely protected by heavy steel plates, is provided with portholes, and is apparently proof against everything but artillery fire. Its principal use is to be the transportation of field guns and other equipment in time of battle. It has space sufficient for seven machine guns.

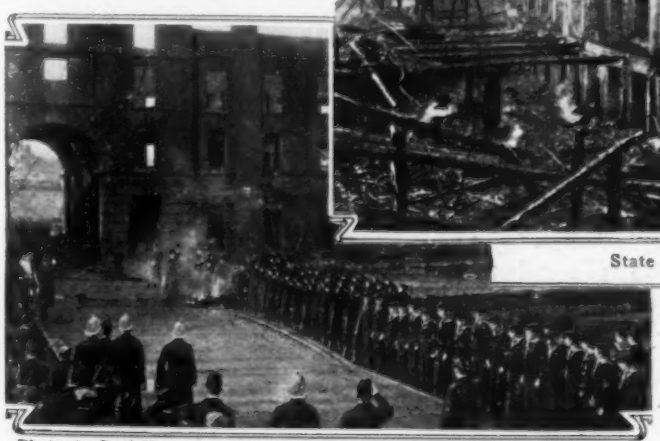


Armored Automobile for Mexican Rebels: Proof against Everything but Artillery Fire

MILITARY SALUTE FIRED AT SCENE OF DEATH

A remarkable and impressive scene occurred in England recently in connection with the funeral services of a petty officer and a signalman of the British navy, who lost their lives at their posts of duty in the great dockyard fire. The military salute, usually fired over the graves of the dead, was in this case fired amid the charred ruins where these men met their death.

State of Dockyard after Fire



Photos by Paul Thompson

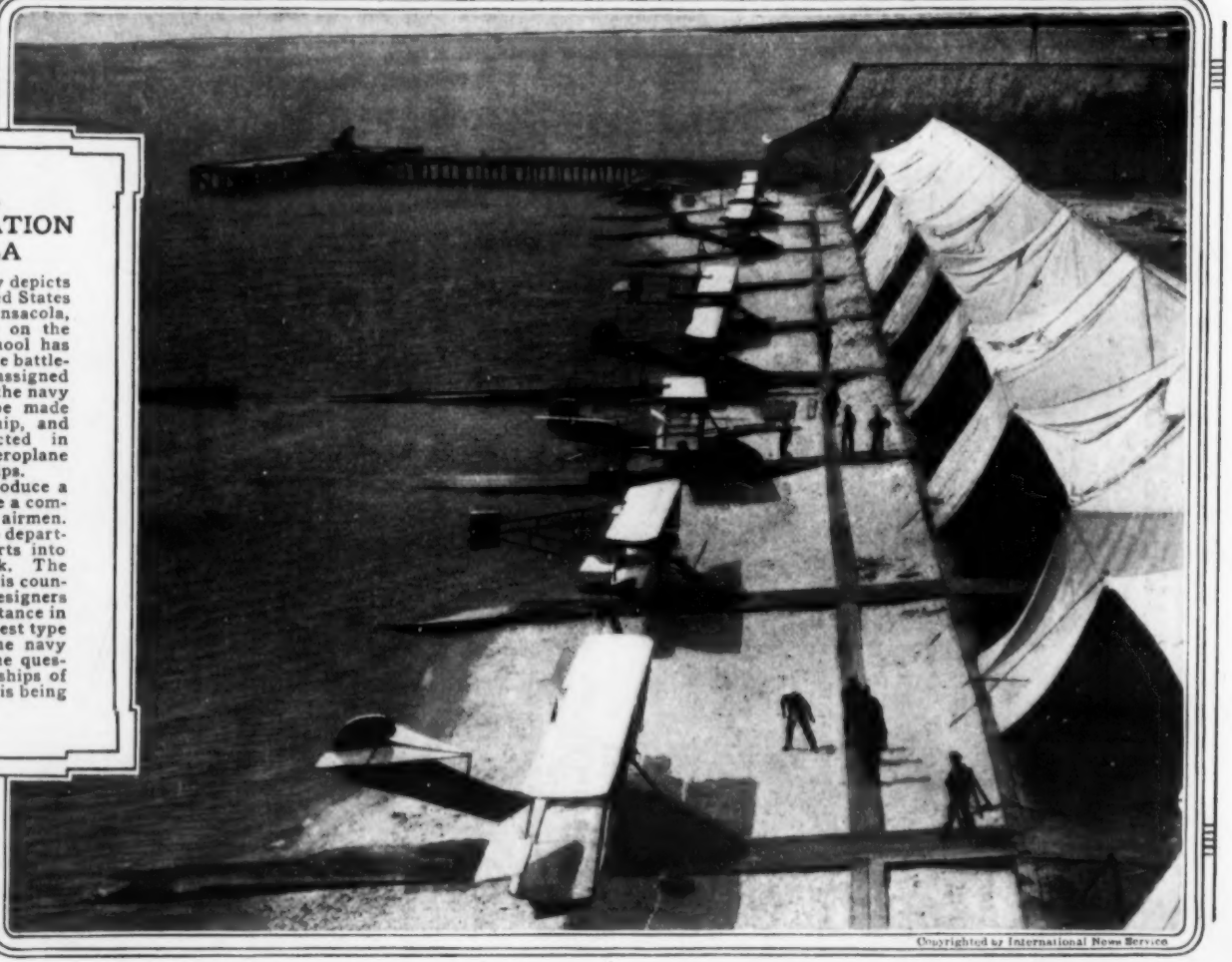
Firing Squad from British Warship "Neptune," Firing Salute in Honor of Comrades Who Lost Their Lives in Dockyard Fire

Such a procedure is unusual, although it is not an uncommon thing to fire a salute over the water in honor of officers who have lost their lives at sea.

THE NAVAL AERONAUTIC STATION AT PENSACOLA

THIS picture graphically depicts the air fleet of the United States Navy in quarters at Pensacola, where hangars are ranged on the beach. A navy aviation school has been established here, and the battleship "Mississippi" has been assigned to Pensacola for the use of the navy flying men. Flights will be made from the deck of the warship, and other experiments conducted in developing the use of the aeroplane in connection with battleships.

The school will aim to produce a trained personnel and evolve a complete system of training for airmen. It will also be the aim of the department to bring outside experts into close touch with the work. The manufacture of air craft in this country is to be encouraged and designers will be given financial assistance in providing for our navy the best type of air craft obtainable. The navy now has no dirigibles, but the question of the addition of airships of this type to the naval force is being considered.



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The "LOST PORT" of NEW YORK

RUDYARD KIPLING'S Prophetic Vision of Man's Conquest of Time and Space.

[No one has visualized so graphically as Rudyard Kipling the changes that the development of aerial navigation is bound to bring about in human relations and human conceptions. Man's mastery of time and space, with which he dealt so imaginatively and convincingly in "With the Night Mail," furnished the theme of an address recently delivered by this most famous of living English writers before the Royal Geographical Society, from which the following extracts are taken.—Editor]

THE time is near when men will receive their normal impressions of a new country suddenly and in plan, not gradually and in perspective; when the most extreme distances will be brought within the compass of one week's travel; when the word "inaccessible," as applied to any given spot on the surface of the globe, will cease to have any meaning.

Naturally, so long as we travel by sea, we must embark from a port and look out for the landfalls. But the time is not far off when the traveler will know and care just as little whether he is over sea or land as we today know and care whether our steamer is over forty fathoms or the Tuscarora Deep. Then we shall hear the lost ports of New York and Bombay howling like Tarshish and Tyre. Incidentally, too, we shall change all our mental pictures of travel.

The men of the present are already scouting and reporting along the fantastic skyline of the future. Nearly all that can be accomplished by the old means of exploration has been won. The old mechanism has been scrapped; the moods and emotions that went with it must follow.

Up to the present we have been forced to move in two dimensions by the help of the three beasts of burden and a few live coals in a pot. Now we perceive that we can move in three dimensions and the possibilities of our new freedom distract and disturb us in all our relations. This is because our minds are still hobbled and knee-haltered by inherited memories of what were held to be immutable facts—distance, height and depth, separation, homesickness, the fear of accident and foul weather.

Month by month the earth shrinks actually and, what is more important, in imagination. For the moment, but only for the moment, the new machines are outstripping mankind. We have cut down enormously, we shall cut down inconceivably, the world's conception of time and space, which is the big flywheel of the world's progress. What wonder that the great world-engine which we call civilization should race and heat a little!

Only the spirit of man carries on unaltered and unappeasable. There will arise—they are shaping themselves even now—risks to be met, as cruel as any that Hudson or Scott faced; dreams, as worldwide as those Columbus or Cecil Rhodes dreamed, to be made good or to die for; and decisions to be taken, as spendidly terrible as that which Drake clinched by Magellan or Oates a little farther south. There is no break in the line, no loads are missing. The men of the present have begun the discovery of the new world with the same devoutly careless passion as their predecessors completed the discovery of the old.

NEW ELECTRIC BUS PROPOSED

Designs have been accepted and a full-sized model made of an electric motor bus, to run on the streets of

New Motor Bus for Residence Districts of New York

New York not covered by street-car lines. The body is of the semiconvertible type, with comfortable seats. Storage batteries give light, heat and power. The car is a "pay-as-you-enter" style, and it is proposed to have young women in uniform to take up the nickels, for the motor-bus line is to be operated on a five-cent basis. Routes are proposed throughout residence districts, where the noise and dirt of street-car traffic would be objectionable.

TRANSATLANTIC FLIER TO HAVE SILK WINGS

Silk instead of canvas will be used in the covering of the planes of the flying boat which Glenn Curtiss is building to try for the Lord Northcliffe prize for a flight from Newfoundland to Ireland this summer. The silk will be coated with a preparation similar to collodion. The saving in weight will be 20 lb. As gasoline weighs 6.15 lb. a gallon, this will enable the machine to fly nearly 25 miles farther, for it is calculated that each gallon will carry the craft eight miles. The flying boat will be painted a bright red, to make it conspicuous, so that captains of ocean liners, who will constantly be on lookout, may be able to make it out at the greatest possible distance, either in the air or on the water. Trial flights will be made at Hammondsport, N. Y., for a month, and the machine will then be sent to Newfoundland, where after a careful "tuning up" it will be prepared to make the attempt as soon as weather conditions are favorable.

OUTSIDE WINDOW BOXES OF METAL

Metal window-sill boxes for kitchens that have no pantries and for homes that have no gardens have been put on the market. They are made of flat galvanized wire and can be screwed to the window frame in a moment. During the winter such a box can be

A Metal Substitute for Wooden Window Boxes

used as an outdoor refrigerator and during the summer a few flower pots placed in it make a garden outside the window.

LARGE SUNDIAL MARKS TIME OF DAY IN PARK

This Huge Sundial in a San Francisco Park Adds Greatly to the Interest of Visitors; Flower-Beds Serve to Mark the Points of the Compass

In one of the San Francisco parks a sundial of unusual size attracts attention. The park itself is 150 ft. in diameter, and within, the sundial is 34 ft. across. The gnomon, or index, of the dial, which by its shadow shows the time, is 28 ft. long; the Roman numerals are 4 ft. long. The points of the compass are indicated by initials in flowers on a closely cropped lawn. Intermediate with these are symbolical columns representing Childhood, Spring and Morning; Youth, Summer and Noon; Manhood, Afternoon and Autumn, and Old Age, Winter and Night. Bronze vases adorn the tops of these columns, and convenient seats of concrete provide resting places.

GIGANTIC RUBBER TREE IN BOLIVIA

What is probably the largest rubber tree in the world exists in Bolivia, near the frontier of Acre. It is 27 ft. in circumference at the base and towers upward to a vast height. Its recorded yield for 120 days averaged 22 lb. a day, which, at the current price for gum, represents more than $2,160 per annum. When it is remembered that, usually, rubber trees do not exceed from 10 to 15 ft. in circumference, while many varieties grow no larger than 8 ft. around, this veritable giant of the forest is a rare exception. The superintendent of the plantation upon which this tree is growing is making a study of the soil, in the hope that he may be able to stimulate the growth of other rubber trees under his supervision.

RECORD-MAKING FLIGHTS BY RUSSIAN BIPLANE

An enormous biplane made by the Russian builder, Sikorsky, has succeeded in making a flight of 18 minutes' duration with 16 passengers on board, the weight of the passengers and crew carried in this remarkable flight being 2,640 lb. Even more sensational was a cross-country flight made by the same machine when it had the pilot and eight passengers on board and maintained an average height of 3,000 ft. for a period of 2 hr. 6 min. This establishes a record both for duration and altitude for an aeroplane carrying nine persons. This machine is of peculiar construction and is similar to the first one of its type, described in the November, 1913, number of this magazine. The span of the upper plane is 114 ft., while the fore-and-aft length of the aeroplane is 62 ft. The wings are spaced 9 ft. apart and have a total supporting surface of 1,820 sq. ft. The weight of the aeroplane when empty is 8,250 lb. It is fitted with four motors of 100 hp. each, and provision is made for installing a fifth motor if desired.

MOTORCYCLE SAVES AFRICAN EXPLORERS

When the rear axle of their automobile was damaged, a party of Englishmen who are exploring the dark continent from the Cape to Cairo were saved from disaster through the possession of a motorcycle. One of the party, mounting the "single-tracker," started backward over the jungle paths for an outpost of civilization, where repairs could be obtained, eventually returning in triumph with the necessary parts. The party is equipped, in addition to usual supplies, with a motion-picture machine, with which to record events of special interest.

¶A motor cargo boat with a capacity of 70 tons is in service on the Leeds Canal, England.

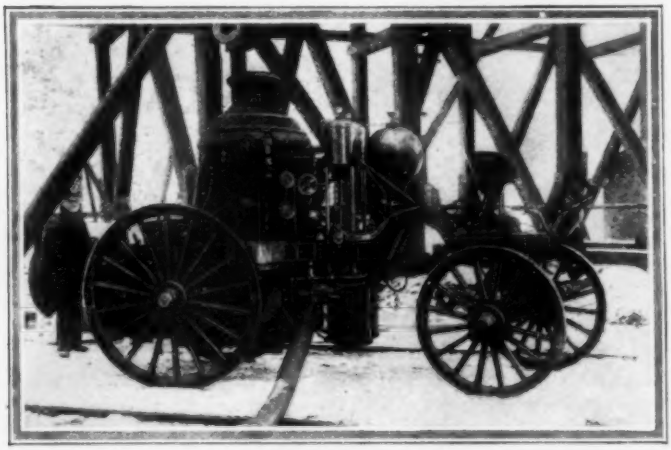
LIVES LOST IN SPECTACULAR NIGHT FIRE

Early on the morning of March 9, fire was discovered on the third floor of the Missouri Athletic Club, St. Louis. Despite the efforts of the firemen, the entire building was destroyed, and many lives were lost. The first floor was occupied by the Boatmen's Bank, while the upper floors, originally intended for commercial purposes, had been reconstructed for club use. Here nearly a hundred members were asleep when the fire broke out. So rapid was the spread of the flames that many perished in their rooms. Others, jumping from the upper floors, were dashed to death upon the pavement beneath. Thirty-seven are believed to have died in the disaster. A week later, one of the walls collapsed while a crowd watched the workmen exploring the ruins for the dead, and one man was killed beneath the crashing masonry, and 20 more injured. The accompanying view is from a photograph made the morning after the fire.

The Burning of the Missouri Athletic Club, St. Louis, in Which Thirty-Seven Lives were Lost

FIRE ENGINE MAKES LONG PUMPING RECORD

A fire in one of the great coal docks at Superior, Wis., proved to be a stubborn one. A fire engine made a



Engine Which Pumped Water on One Fire for Three Months

remarkable record for continuous performance in playing upon this fire, when it pumped from Nov. 18, 1913, until Feb. 18, 1914, just three months, shutting down but five times for repairs. The grates burned out, which caused one of the stops; broken valve springs required three stops, and a broken piston follower was the cause of the other shutdown. Repairs, however, were quickly made, and, as compared with the total length of run, did not amount to anything. The same engine made another long run in 1912 at a similar fire.

ABANDON THE SUNKEN SUBMARINE "A 7"

The British Admiralty having decided to abandon further efforts to raise the submarine "A 7," which failed to rise when maneuvering on January 16, last, funeral services were held over the spot in Whitsand Bay in the English Channel, where the unfortunate vessel lies submerged in 23 fathoms of water. A procession of ships left Devonport Harbor with flags at half-mast. When the buoy which marked the scene of the disappearance of the "A 7" was reached, the funeral service was read for the 11 men who perished in the disaster, volleys were fired over the water by the marine guard, and a wreath of flowers was cast over the side of the ship by the little son of one of the engineer officers who died in the ill-fated vessel.

HAUL AEROPLANE THROUGH CITY STREETS

An unusual spectacle was presented when a truck was seen hauling an aeroplane through the streets of Chicago. The plane was dismembered, the broad wings having been removed

An Aeroplane being Towed by an Automobile is an Unusual Sight in a Busy City Street

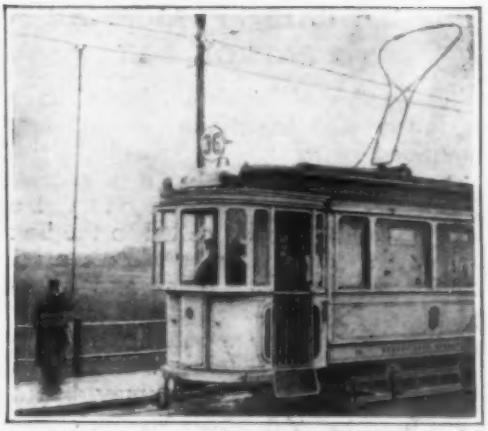
and the propeller taken off and carried in the truck. The rear end of the plane was placed in the truck and carefully fastened. The weight of the flying machine was borne upon its two small rubber-tired wheels, and a passenger rode in the pilot's seat during the trip across town.

HOW FAR A MAN CAN SEE DISTINCTLY

Some interesting experiments have been made in the German army with the object of discovering at what distance the recognition of one soldier by another is reliable. For soldiers with good eyes it was found that a person seen once before could be recognized at a distance of 80 ft., while an acquaintance could be recognized at a distance of 300 ft., and an intimate friend or relative, at a distance of 500 ft. The various parts of a man's body can be distinguished and any decided movement can be detected by an expert rifleman at a distance of 300 ft. At 1,800 ft. a man appears as a spot on the landscape and cannot usually be seen if he keeps still or if his dress does not contrast with the background. Sailors, hunters and farmers can usually see twice these distances, probably on account of their constant training in making out the nature of distant objects.

TRAFFIC TELEPHONE USED IN GERMANY

An electric street railway in Frankfort-on-the-Main has recently supplied its lines with a portable telephone to enable the conductors or motormen to report troubles directly to the main office. The telephone is of ordinary construction, but the connection has novel features. A long pole, equipped with uninsulated hooks, is carried on the car, and when connection is desired the pole is taken out and hung on the telephone wires at the side of the track. The battery case and phone is so constructed that it may be easily carried during conversation, straps being provided for suspending the apparatus over the shoulder.



Portable Telephone-Connection Apparatus Used on German Street-Railway System

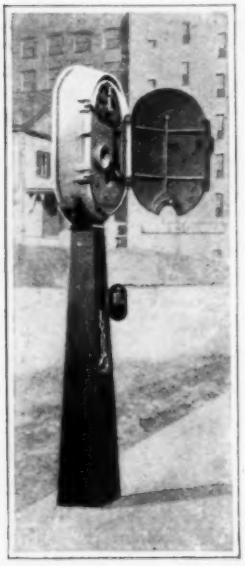
ODD CHINESE WHEELBARROW HAULS BIG LOAD

A barrow with a wheel as big as that used on a wagon is used in some parts of China, and loads of considerable weight are hauled upon it. The box or bed of the barrow is divided, so that the wheel occupies the central space, the load being piled or fastened on either side. Such well-balanced loads as that shown in the illustration are not uncommon.

A Chinese Passenger Wheelbarrow

LIGHT CALLS POLICEMAN TO PATROL BOX

The police of Brockton, Mass., have installed an ingenious signal box equipped with an electric light by which a patrolman may be called to the box by the central office and information given quickly regarding suspects who may be in his vicinity. Beneath the main box is a small compartment, opened by a push button, containing a pair of handcuffs securely chained to the post. These are used when a prisoner becomes unmanageable, or when two persons are arrested and one escapes. By hitching one to the post the patrolman is able to pursue the other, and often to capture him. The box was invented and is patented by the electrician of the Brockton Police Department.



GERMAN AIRMAN SETS NEW LONG-FLIGHT RECORD

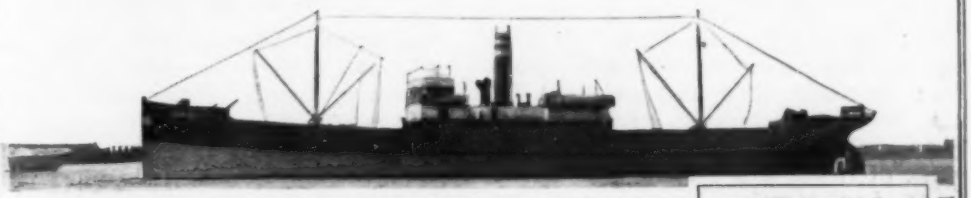
Maintaining an average speed of nearly 65 miles an hour, Karl Ingold, a German airman, flew continuously from 7:35 a. m. until 11:55 p. m. on the 7th of February, 1914, covering 1,056 miles in 16 hr. 20 min., thus breaking the previous nonstop record set three days before by Bruno Langer, whose feat was mentioned in the April issue of this magazine. Langer used a biplane of German manufacture, equipped with a 100-hp. motor, and flew from Mühlhausen to Munich, several hours of his flight being made in the dark.

SHIP CUT TO PIECES WITH OXYACETYLENE FLAME

The hull of the "Alum Chine," the British freight steamship which was destroyed by a dynamite explosion in Baltimore Harbor, as described in the May, 1913, issue of this magazine, has been raised from the bottom of the harbor, cut to pieces by means of the oxyacetylene flame, and sold for scrap.

The 1,800 tons of warped and tangled steel which sank to the bottom in 33 ft. of water when 300 tons of dynamite exploded, constituted a serious menace to navigation. Divers laid strings of dynamite which blew the ship into pieces that could be handled by a floating derrick. The plates and beams were so twisted and bent that ordinary methods of cutting up the scrap would have been hopelessly expensive. By employing the oxyacetylene process, however, the entire hulk was utilized. To this flame, scarcely 3 in. long, plates, beams and rivets formed no serious obstacle, the flame eating its way along at the rate of about a foot a minute until all the scrap had been reduced to pieces small enough to be loaded on wagons. The high temperature of the oxyacetylene flame, about 6,300° F., fuses the metal rapidly, while a jet of pure oxygen injected through the center of the flame against the hot surface oxidizes the steel so that it runs away in a thin stream, leaving a clean, narrow cut in the metal.

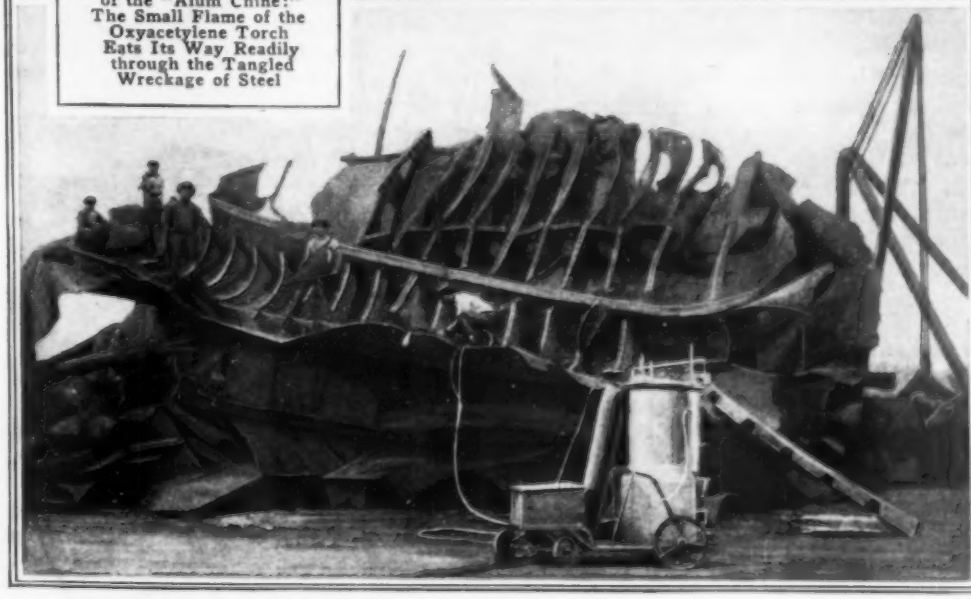
The violence of the explosion that wrecked this vessel was almost beyond belief. The entire forward part of the ship was blown away and the deck and upper works were reduced to fragments, pieces of steel from 3 to 5 ft. long being found at distances of from two to three miles from the wreck. The naval collier "Jason" was so seriously damaged by the explosion that it took three months to repair it. The collier had just been completed and was still in the hands of the contractors. It was to depart on the following morning on the preliminary acceptance trials. After the explosion the



The "Alum Chine" as It Appeared before the Explosion of 300 Tons of Dynamite Which Sank the Ship

Stern of the "Alum Chine," Showing the Propeller Shaft Blown Out and the Sternpost Broken by the Force of the Explosion

Cutting Up the Hull of the "Alum Chine:" The Small Flame of the Oxyacetylene Torch Eats Its Way Readily through the Tangled Wreckage of Steel



"Jason" had the appearance of a ship that had passed through a severe bombardment. The hull was pierced in many places and much of the steel plating was badly dented. The superstructure was wrenched and twisted, the side bulkheads bulged, and the rigging cut to shreds, while the woodwork of the interior was reduced to a mass of splinters.

CONFISCATED WEAPONS ARE THROWN OVERBOARD

Every year the harbor patrol of the New York police department takes a

New York Police Throwing Confiscated Weapons into the Bay

consignment of confiscated firearms, knives, razors, brass knuckles and burglar tools down the bay, and officers cast them overboard by the armful. While the laws of New York prohibit the purchase or possession of firearms by any citizen without a permit, other states are not so particular, and thugs have little trouble in refurnishing their armories. When arrested in New York, their weapons are confiscated and thrown into the bay. Weapons worth $5,000, or more, were so disposed of recently.

¶The San Francisco-Hawaii cable cost $20,000,000, while wireless stations for the same service cost only $500,000.

BATHROOM LIGHTS SHOULD BE IN CEILING

An extended inquiry has been made by some French scientists, for the Society of Legal Medicine, into accidents from electric shock occurring in bathrooms. Here, it is found, there is peculiar danger, owing to the fact that when the surface of the body is moist, it offers far less resistance to the current than when dry. Currents of as low tension as 46 volts were found to be dangerous, and might even be fatal in such cases. As it is customary to install lighting fixtures in side walls, at such a height that they may be touched by a person standing in a bathtub, or on the floor, a warning was given that this common danger might be eliminated. The logical place for electric-lighting fixtures for the bathroom, so it is stated, is in the ceiling, with a perfectly insulated flush switch just inside the door.

AUTOMATIC CORN-POPPING MACHINE

Popcorn must be freshly popped to be palatable. This necessity has long kept this popular commodity from being vended in nickel-in-the-slot machines, but at last an inventor has found a way to surmount the difficulty. An automatic corn popper is now on the market which delivers freshly popped corn upon placing a coin in the slot. The machine consists of an upright case, within which a complicated mechanism is started by the revolution of a handle outside the machine, and completes the process automatically. An elec-

Rudderless Flying Boat Steered by Movable Jibs

tric contact is made, the motor starts revolving the popping cylinder and measures into it just the amount of corn required for one bag. An electric resistance mesh, which lines the cylinder, provides the heat necessary to pop the corn. A paper bag is pushed out for the customer, who holds it beneath the spout, from which the freshly popped kernels are delivered. Unpopped kernels are shunted into a receptacle within the machine. After the corn has been put in the bag, the customer may, if he desires, season it by holding the bag beneath another chute, from which, upon pressing two buttons, butter and salt flow in measured quantities. A plate-glass window in the front of the machine enables the customer to see the corn popping. The case is about 5 ft. high and about 2 ft. square. It must, of course, be connected to a source of electric supply by wire.

FLYING BOAT HAS NOVEL CONTROL

A tailless flying boat with a jib control which has novel features was exhibited at the motorboat show. Instead of a vertical rudder, used in conjunction with devices for warping the wings, two jibs arranged at the extreme ends of the planes may be partially revolved about an oblique axis from the lower end of the forward strut to the upper end of the rear strut. By pulling or pushing the steering wheel forward or backward, the pilot turns the jib on the side he desires, toward the engine. This produces a drag in the air on that side and the down pressure results in "banking" the machine, which thereupon makes a turn with the operated jib on the inside, toward the center of the circle. No rudder is necessary, the jibs permitting complete control to be exercised. A small "elevator" is set at the fore end of the hull, by which means the pilot is enabled to rise clear of the water, or direct the machine in climbing.

MORE DAYLIGHT WORKING HOURS FOR CLEVELAND

A practical way to obtain more daylight during the working day has been worked out in Cleveland, Ohio, by the simple expedient of changing from standard central to standard eastern time. With central time the Cleveland clocks are 33 minutes slower than sun time, while on eastern time they run 27 minutes ahead of the sun. It is estimated that, as a result of the change, 201 more hours of daylight a year will be available between the hours of 6 a. m. and 10 p. m., and that 201 more hours of darkness will be

provided for sleep during the early part of the night. With this system the earliest setting of the sun will occur at 4:55 p. m., so that nearly all factories will close before sunset even during the shortest day, while during the spring, summer and fall, a total of 234 additional daylight hours will be available after 5:30 p. m. for outdoor recreation. The dividing line between central and eastern time is now at Buffalo and Pittsburgh.

MOTOR-CAR SIGN CARRIES "RED HAND OF ULSTER"

How deep into the past the feelings of the Irish people reach in the present home-rule contest is indicated by the sign carried by the motor-car corps of the Ulster Volunteer Force. On the sign are the shamrock, a crown and the "Red Hand of Ulster." The emblem of the red hand had its origin in the ancient days when Ireland was ruled by rival chieftains who were often at war with each other, and dates from a battle in which the Ulster forces were led by one of the O'Neills. The battle was going against the Ulster forces, and to add to their misfortunes the chieftain's right hand was cut off by a well-aimed blow from the sword of one of the opposing force. Picking up the severed hand, O'Neill threw it as far as he could into the ranks of the enemy and ordered his men to recover it. The fury of the attack of the Ulster army in carrying out this command turned the tide of battle in their favor, and gave them also a symbol of their determination to remain a district distinct from the remainder of Ireland.

Courtesy The Sketch

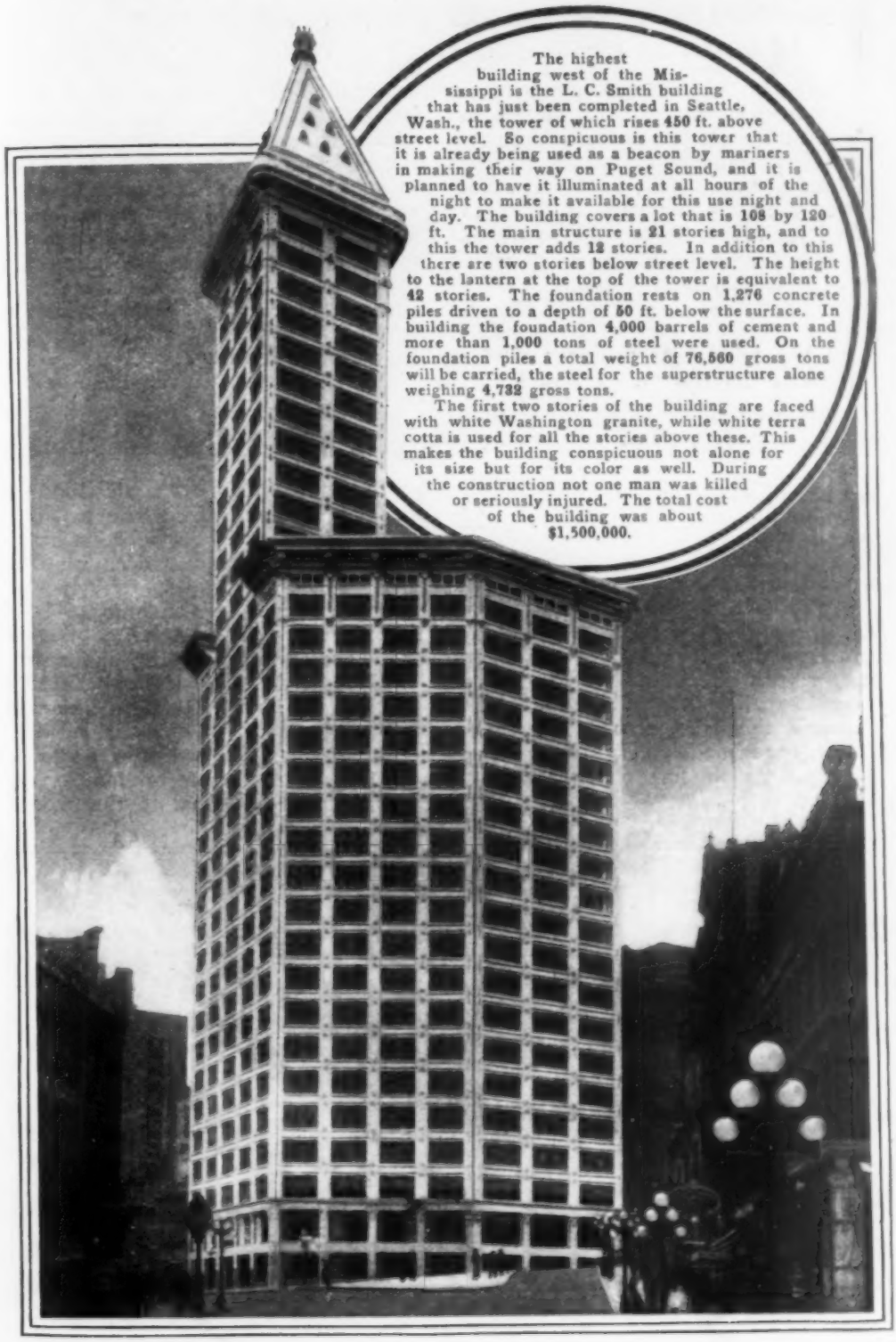
GERMAN DIRIGIBLE TO FLY AT SAN FRANCISCO FAIR

What is expected to be the largest dirigible balloon ever built will be sent to the Panama-Pacific Exposition by a German firm and will be operated as a passenger carrier, on a daily schedule. The dirigible, of the Parseval, or semi-rigid, type, will have a length of 480 ft., a diameter of 80 ft., and will cost more than $250,000. A portable hangar is to be brought from Germany, along with two licensed crews of eight men each, who are to operate the big airship. A complete gas plant will also be built for the sole use of the German craft. Trips of about 50 miles will be made, the rate being fixed at $25 each. When not making trips, the dirigible will be on exhibition in its hangar, where exposition visitors will be allowed to inspect it, going through the interior, seeing the observation rooms, sleeping quarters, diner, kitchen, bath and smoking rooms, which make it a modern transportation palace. Passenger dirigibles are familiar sights in northern Europe, but a novelty in America.

SHALLOW-DRAFT WARSHIPS BUILT BY BRITISH

In striking contrast to the super-dreadnoughts launched by the British Admiralty in the last two years is a new type of battleship with shallow draft and guns especially mounted for attack on aeroplanes and dirigibles. The "Royal Oak" is the first of this type. It will be armed with 5 and 6-in. guns built to be trained almost perpendicularly. These are mostly rapid-fire guns and are expected to give a good account of themselves in action. The shallow draft is designed to present as small a target as possible against submarines. The new vessels are to be of but 25,000 tons and maintain a speed of 28¾ miles an hour. Both coal and fuel oil will be carried, and a platform will be built from which to launch flying boats.

TALLEST BUILDING WEST OF THE MISSISSIPPI



The highest building west of the Mississippi is the L. C. Smith building that has just been completed in Seattle, Wash., the tower of which rises 450 ft. above street level. So conspicuous is this tower that it is already being used as a beacon by mariners in making their way on Puget Sound, and it is planned to have it illuminated at all hours of the night to make it available for this use night and day. The building covers a lot that is 108 by 120 ft. The main structure is 21 stories high, and to this the tower adds 12 stories. In addition to this there are two stories below street level. The height to the lantern at the top of the tower is equivalent to 42 stories. The foundation rests on 1,276 concrete piles driven to a depth of 50 ft. below the surface. In building the foundation 4,000 barrels of cement and more than 1,000 tons of steel were used. On the foundation piles a total weight of 76,560 gross tons will be carried, the steel for the superstructure alone weighing 4,732 gross tons.

The first two stories of the building are faced with white Washington granite, while white terra cotta is used for all the stories above these. This makes the building conspicuous not alone for its size but for its color as well. During the construction not one man was killed or seriously injured. The total cost of the building was about $1,500,000.

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STRONGEST ELECTROMAGNET IS BUILT IN FRANCE

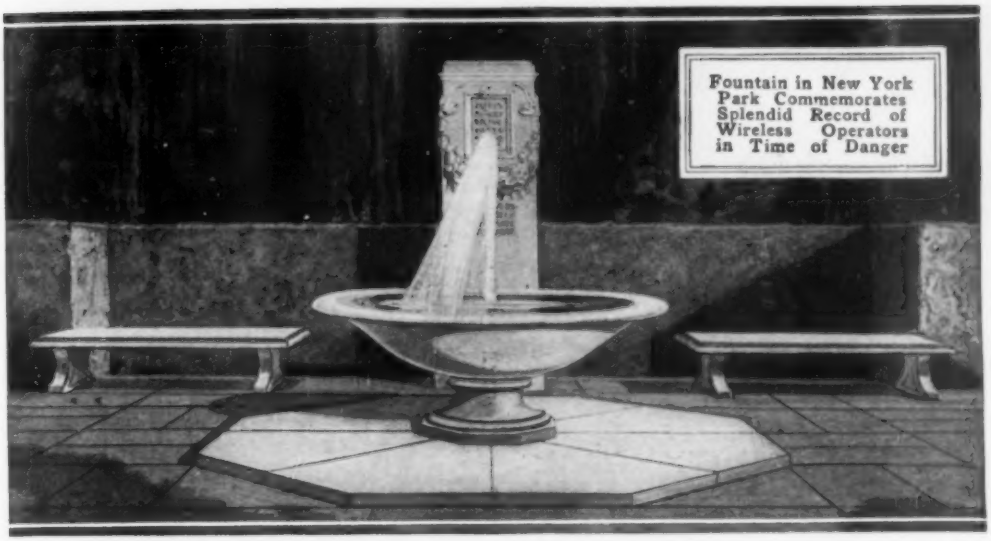
Recently two French scientists exhibited before the Academy of Sciences in Paris an electromagnet of remarkable power, but the usefulness of which is limited to scientific work. It differs from previous magnets in that the windings are made of metallic ribbons of almost infinitesimal thinness, which are cooled by a circulating bath of gasoline at very low temperature. To give a concrete idea of its power it may be stated that ordinary electromagnets used in lifting pig iron in foundries operate with a magnetic-field intensity of from 8,000 to 14,000 units, while the new magnet produces 52,000 units, and a still larger one is projected which will employ 75,000 units. Yet the additional power shown is gained at such a cost that it cannot be commercially utilized. In experiments with polarization of light through the magnetic field, or in deflecting the cathode rays from the X-ray machine, such an electromagnet might have a laboratory value, but otherwise it has only a scientific interest.

PREPARING FOR SIGHT-SEERS AT THE PANAMA CANAL

For the thousands who will visit the Isthmus to view the completed Panama Canal, ample provision is being made. Special sight-seeing trains are scheduled to leave Colon and Panama on alternate mornings through the week, reaching the opposite end of the canal in time for lunch. Passengers may return on the ordinary trains if they so desire. Excursion trips through the lake, from Gamboa to Gatun, are made on a sight-seeing barge which has been converted for passenger service by the addition of a main deck, sloping from rear to front, and provided with comfortable seats, while above, an upper deck may be reached by stairways. Nearly 300 sight-seers can be accommodated on the barge, which has a full equipment of life preservers and safety appliances. The fare for the trip on the lake is fixed at $1.50, and a like sum is charged for the railroad trip along the shore, from one end of the canal to the other.

The Excursion Barge from Which the Wonders of the Canal may be Seen: The Rear Seats are Raised So That the View is Unobstructed

READY FOR THE BIG SHIPS TO PASS THROUGH



Fountain in New York Park Commemorates Splendid Record of Wireless Operators in Time of Danger

MEMORIAL TO WIRELESS HEROES

In Battery Park, New York, will soon be erected a memorial fountain dedicated to the wireless operators who have lost their lives at sea. In most of the recent accidents on the ocean, where the wireless has called to rescue work vessels from a distance, the operators in their wireless stations have stuck to their posts to the last, often going down with the ship, and showing a heroism in aiding women and children to escape a watery grave, which betokens a high order of valor. The fountain, which has been designed by famous architects of New York, will keep alive the memory of these courageous men.

THE CHINESE METHOD OF PRESERVING EGGS

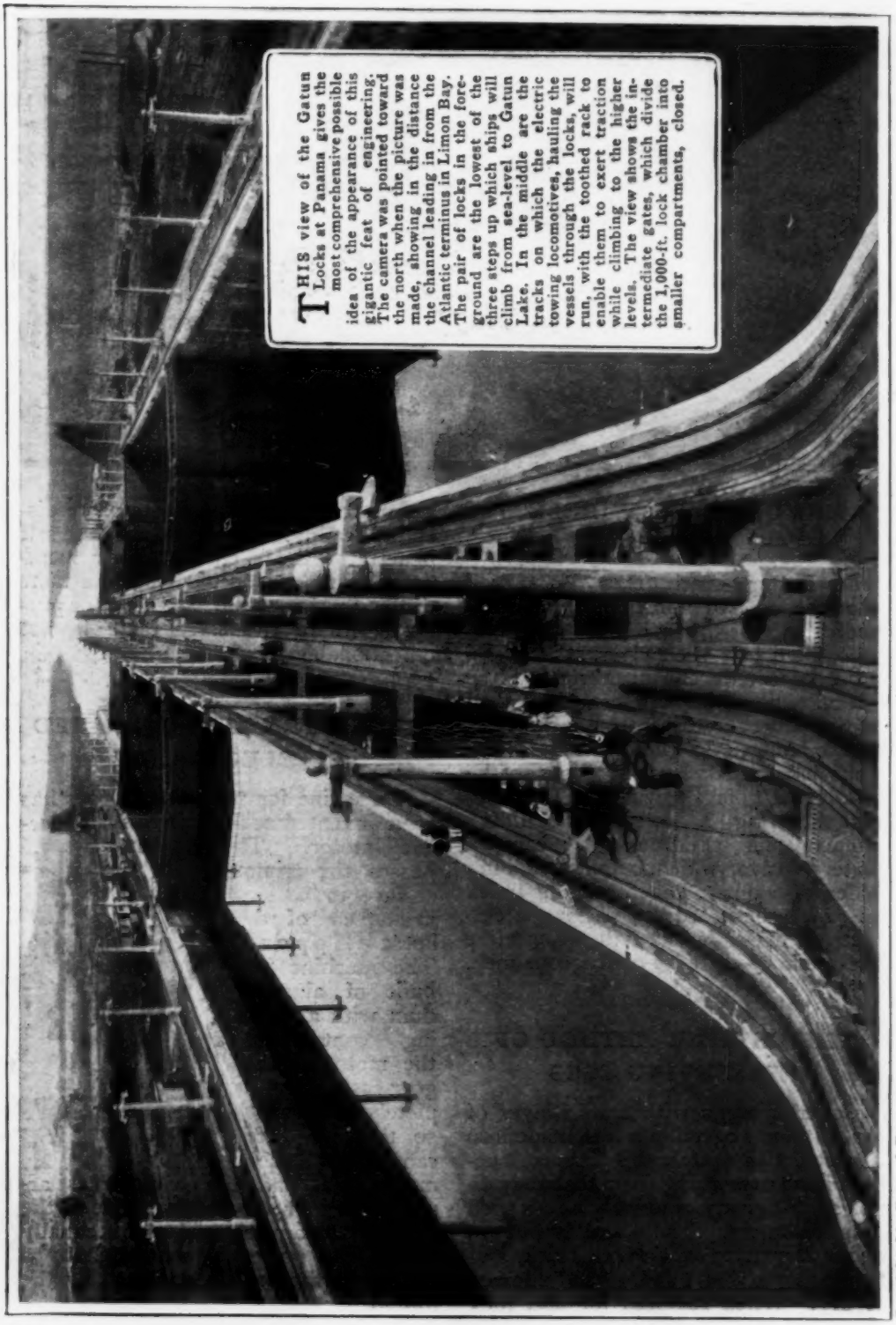
Covering eggs with a thin layer of sea salt and vegetable ashes, made into a paste with water, the Chinese succeed in so preserving them that they do not spoil quickly, and may be shipped long distances. The paste is put on about a quarter of an inch thick, and the eggs are then piled up and allowed to dry. When required for use, they are placed in water, and the paste dissolves readily. It is found that the salt penetrates the shell and inner membrane, giving a decidedly saline taste to the egg, hence they are used for purposes where the salty taste is not objectionable.

HEDGE TRIMMER OPERATED BY ELECTRICITY

A machine for trimming hedges has been invented which carries an electric motor. The operator passes the trimmer over the surface to be shorn after the manner of a horse clipper. The machine is built of aluminum with a casing containing the motor. The gear case is completely inclosed so that no dirt can enter the mechanism, and the trimmer is arranged to be used on either side of the hedge, cutting top and sides equally well. The power is controlled by a switch on the handle, operated by the thumb.

THE SUBMERGED FORESTS OF GATUN LAKE

READY FOR THE BIG SHIPS TO PASS THROUGH



THIS view of the Gatun Locks at Panama gives the most comprehensive possible idea of the appearance of this gigantic feat of engineering. The camera was pointed toward the north when the picture was made, showing in the distance the channel leading in from the Atlantic terminus in Limon Bay. The pair of locks in the foreground are the lowest of the three steps up which ships will climb from sea-level to Gatun Lake. In the middle are the tracks on which the electric towing locomotives, hauling the vessels through the locks, will run, with the toothed rack to enable them to exert traction while climbing to the higher levels. The view shows the intermediate gates, which divide the 1,000-ft. lock chamber into smaller compartments, closed.

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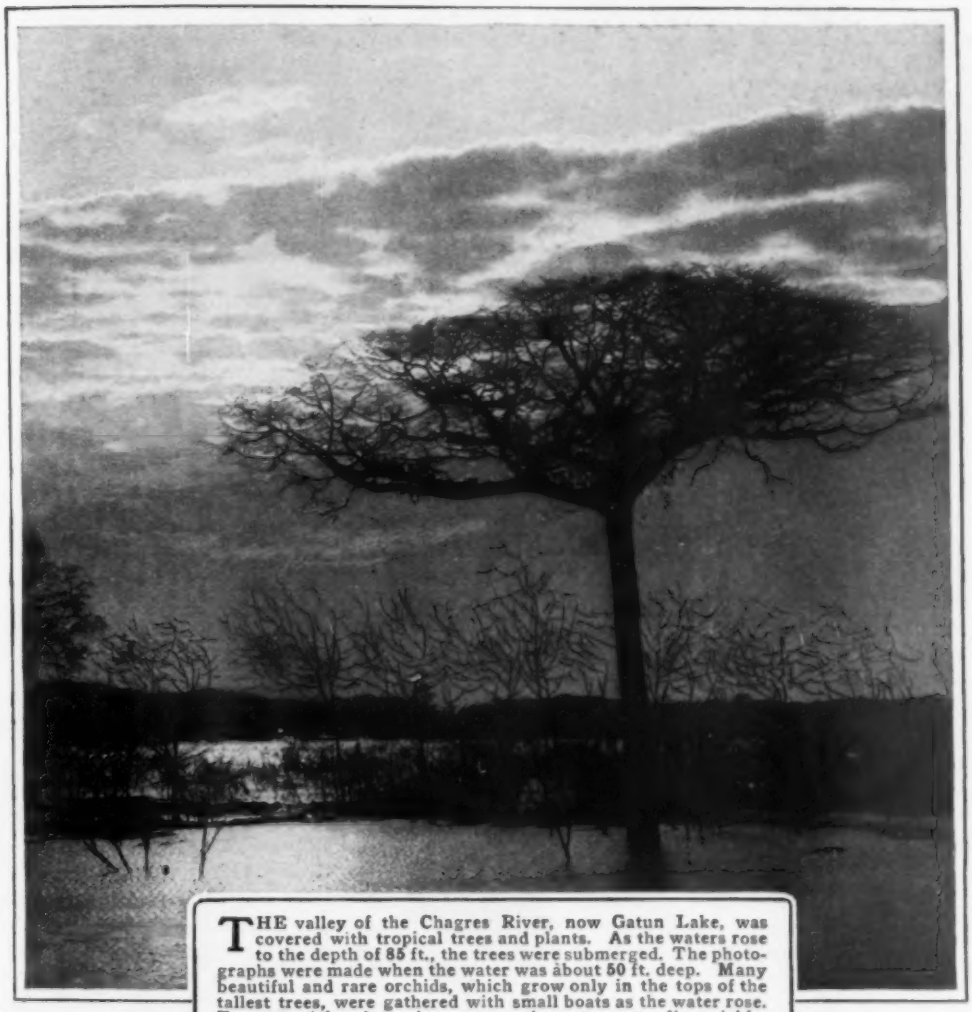
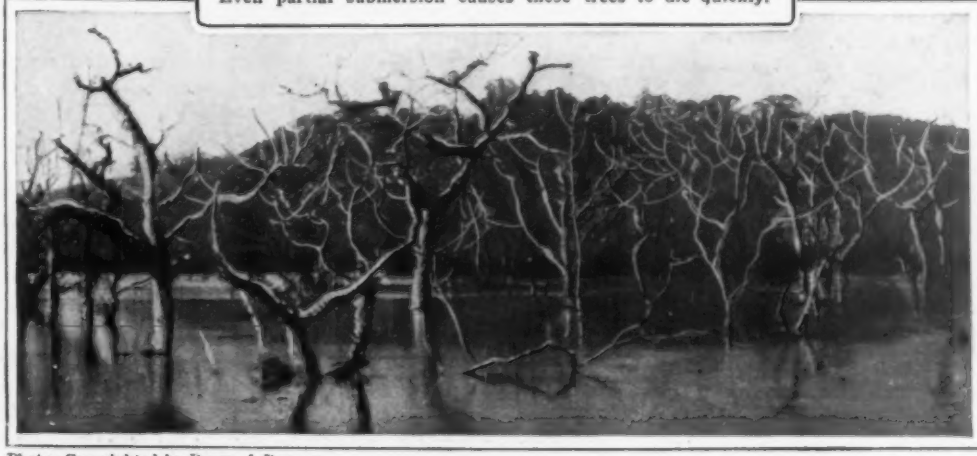
THE SUBMERGED FORESTS OF GATUN LAKE



THE valley of the Chagres River, now Gatun Lake, was covered with tropical trees and plants. As the waters rose to the depth of 85 ft., the trees were submerged. The photographs were made when the water was about 50 ft. deep. Many beautiful and rare orchids, which grow only in the tops of the tallest trees, were gathered with small boats as the water rose. Even partial submersion causes these trees to die quickly.



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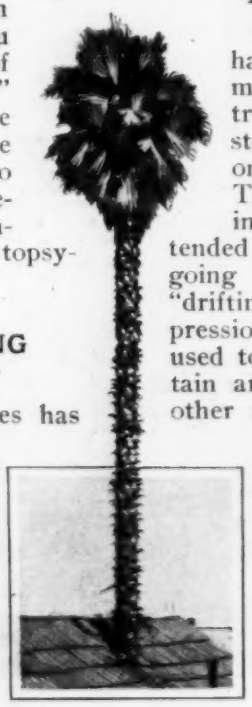
A Topsy-Turvy Banquet in London

"UPSIDE-DOWN" DINNER GIVEN TO AIRMEN

English airmen were summoned to attend a dinner in honor of several of their profession who had achieved distinction in the art of flying, and appropriately enough, in view of the fact that one of the honored guests had just "looped the loop" with a passenger, the entire dinner was served "upside down." The photograph shows the table legs in the air, the banquet being spread upon the bottom of the mahogany. The menu was reversed, and instead of eating "from soup to nuts," toothpicks and black coffee opened the repast, while the fish was the last course. To be sure, the speeches were reserved for the last, but the dinner was otherwise entirely a topsy-turvy affair.

PALM TREE GROWING THROUGH A ROOF

A building in Los Angeles has a "roof tree" which is one of the sights of that city. Years ago the tree, one of the varieties of palm so plentiful in California, stood before a sightly mansion, built when that part of the city was far from the center of business. When the growth of the city turned that residence section into a "downtown" district, it became necessary to build upon the property. The tree, then 60 ft. high, was left, and the structure built around it, a hole in the roof giving it access to light and air. Since then the tree has continued to grow, unaffected, seemingly, by the encroachments of commerce, and is a beautiful and stately landmark.



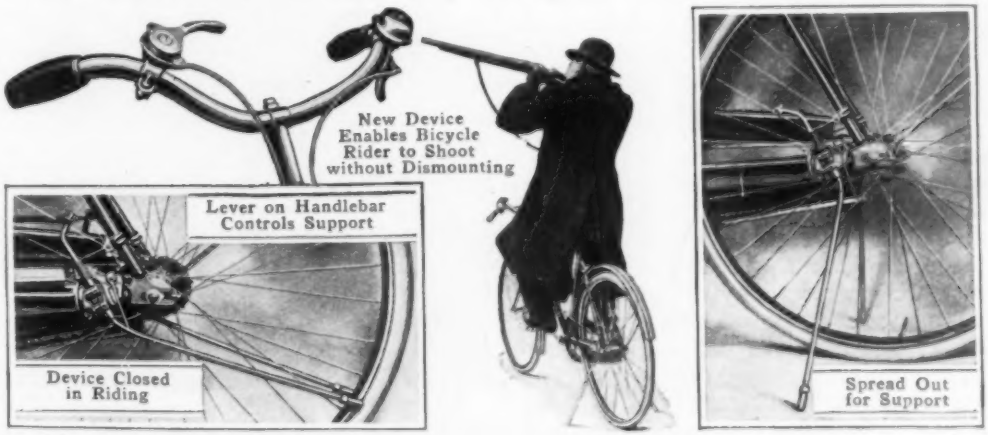
DRIFT FENCES ON NATIONAL FOREST RANGES

Many miles of "drift" fences have been built by the government in recent years for controlling the movements of stock, grazed under permits on the national forest lands. These fences do not serve to inclose areas, but are simply intended to prevent the animals from going in certain directions, or "drifting," to use a cattlemen's expression. In many cases they are used to restrict the animals to certain areas for the summer and to other areas during the winter, as well as to prevent grazing on lands where poisonous plants are found. In one case, five miles of drift fence was built to protect a city water supply from contamination by forest-range cattle. In one forest, a 4½-mile fence was built to keep cattle on one range and

horses on another. On the latter range was an abundance of larkspur, a poisonous plant which cattle will eat but which horses will not touch, while on the cattle range there was practically no larkspur. The fences are built of wire in a substantial manner and are so placed that passage from one range to another can only take place at certain well-established gateways.

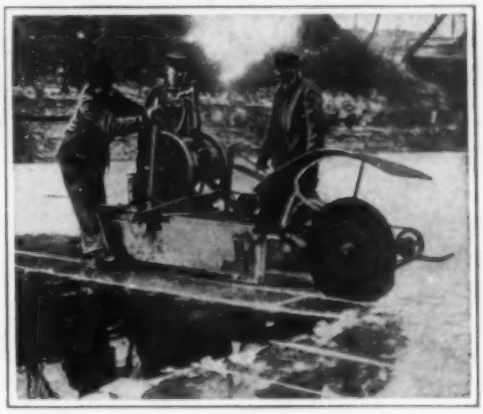
NEW STANDARD TO SUPPORT BICYCLE

A quick-acting support for bicycles has been placed on the market in France, by means of which a rider may stop his wheel and without placing his feet on the ground, sit quietly, or perform such actions as shooting, sketching, taking photos, or the like, without falling. The device consists simply of two steel rods, bent in such a manner that on being rotated they describe a conical surface, resting close to the rim of the wheel when not in use, and forming a wide base line when spread out. The device is brought into play by a lever, which is self-acting and easily released, on the handlebar, connecting with wire cables to the supports. Springs bring the rods back to normal position when the lever is released. It is proposed to equip military bicycles and motorcycles with this appliance, in order to permit soldiers to stop and shoot without getting down out of their seats.


New Device Enables Bicycle Rider to Shoot without Dismounting
Lever on Handlebar Controls Support
Device Closed in Riding
Spread Out for Support

POWER-DRIVEN ICE SAW RECENT INVENTION

Mounted on a large sled, a 4-hp. gasoline engine furnishes the power to run a circular saw, capable of cutting 10-in. ice rapidly. The saw is held in a flexible extension of heavy gas pipe, and a chain-and-sprocket device connects with the jackshaft, which in turn is belted to the engine. The machine is kept in line by means of a thin steel shoe fastened to the runner, which travels in the groove made by an ordinary ice marker. The machine propels itself as the saw takes hold of the ice in cutting. With this machine, the builders state, three men can cut as much ice in one day as 30 men with hand saws.



Circular Saw Rapidly Eats Its Way through the Ice

PRACTICAL DEVICES FOR SLEEPING IN THE OPEN

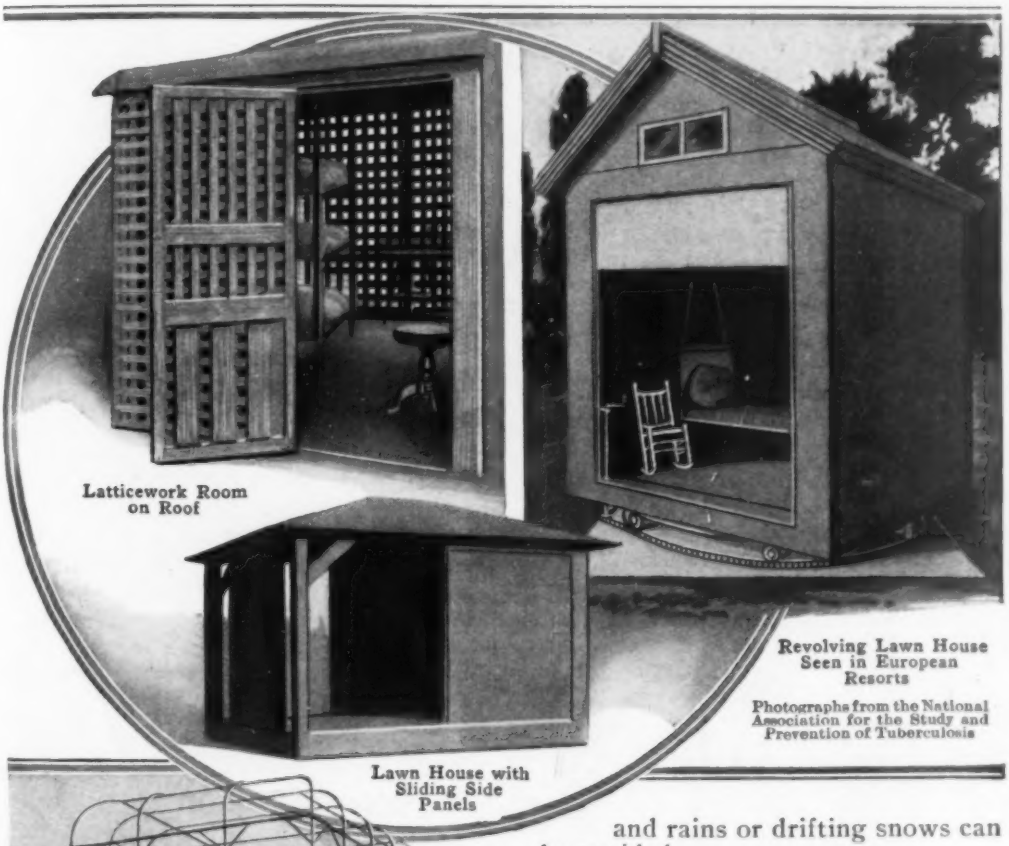
Temporary Sleeping Porches Built at Bedroom Level for Use in Moderate Weather

Temporary Shelter Built on Roof, Canvas Sides Let Down

Tents Pitched on Flat Roof of Els or Additions

Now that the vogue of open-air sleeping has grown beyond the stage of a "treatment" and interests those who want to keep well as much as it does those who want to get well, it is interesting to see how simple, inexpensive and adequate shelter may be provided in or on the ordinary dwelling. A substantial support of scantling, floored and fenced, may be built against the side of the house at the level with a sleeping-room window. Over this a light awning may be drawn for protection against the weather. Here, upon bed or cot, or swinging in a hammock, real open-air sleeping may be indulged in the year around. In brick apartment buildings within fire limits, it may be necessary to make the support of iron, building it like the ordinary fire escape, and supporting it, not from the ground as in the case of the wooden shelter, but by iron rods firmly fixed into the brick walls. Where the roof is flat, or only slightly tilted, the building of a shelter is a very easy matter. A

WHICH ARE SIMPLE AND FEASIBLE IN EVERY HOME

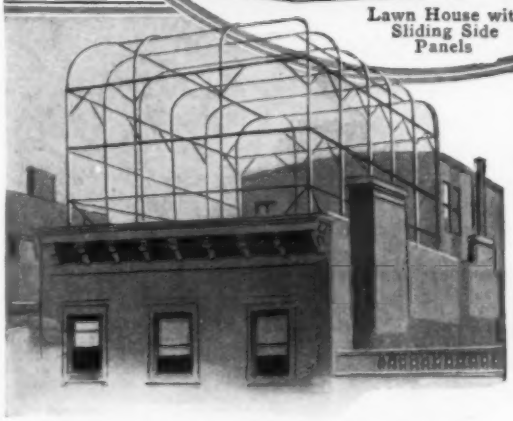


Latticework Room on Roof

Revolving Lawn House Seen in European Resorts

Photographs from the National Association for the Study and Prevention of Tuberculosis

Lawn House with Sliding Side Panels



Framework on Roof Supports Canvas Cover by Night, and Wire Screens by Day, Affording Playground for Children as Well as Sleeping Quarters

light wooden framework, supporting a canvas roof or tent, makes an ideal place for sleep. Usually there is such additional shelter given by chimneys, eaves or side walls, that driving mists and rains or drifting snows can be avoided.

Often a low addition, or the flat roof of a kitchen or shed, will be found available to erect a tent, the ropes being lashed firmly to a wooden railing or to eyelets set into the roof. A more permanent form of this roof tent has lattice-work sides, the canvas being brought only partially down below the roof. In this type of shelter a maximum of ventilation is always attained. To those who do not care to trust themselves to canvas shelters, a roof room made entirely of latticework appeals, the roof only being substantial and covered with thin boards and roofing paper. This gives a permanent sleeping room, to which many conveniences may easily be added. A more flexible form of roof shelter may be obtained by arched supports of iron pipe, over

which canvas may be drawn, and wire screening on the sides may give a playground by day as well as sleeping quarters at night.

Where a roof is not available, the lawn sometimes offers a solution, and a type of lawn house, very popular in Europe, is built upon a platform, having a circular track upon which the house may be turned in any direction, avoiding annoying winds, or giving access to sunlight when desired. A much simpler lawn house has sliding panels of wood, or composition, by which it may be entirely closed, or only one side left open. Such a shelter has all the advantages of the revolving lawn house, with much less expense in construction. With the exception of the iron fire-escape type, these shelters can be constructed very economically, especially when second-hand lumber is used, and the work is done by home talent.

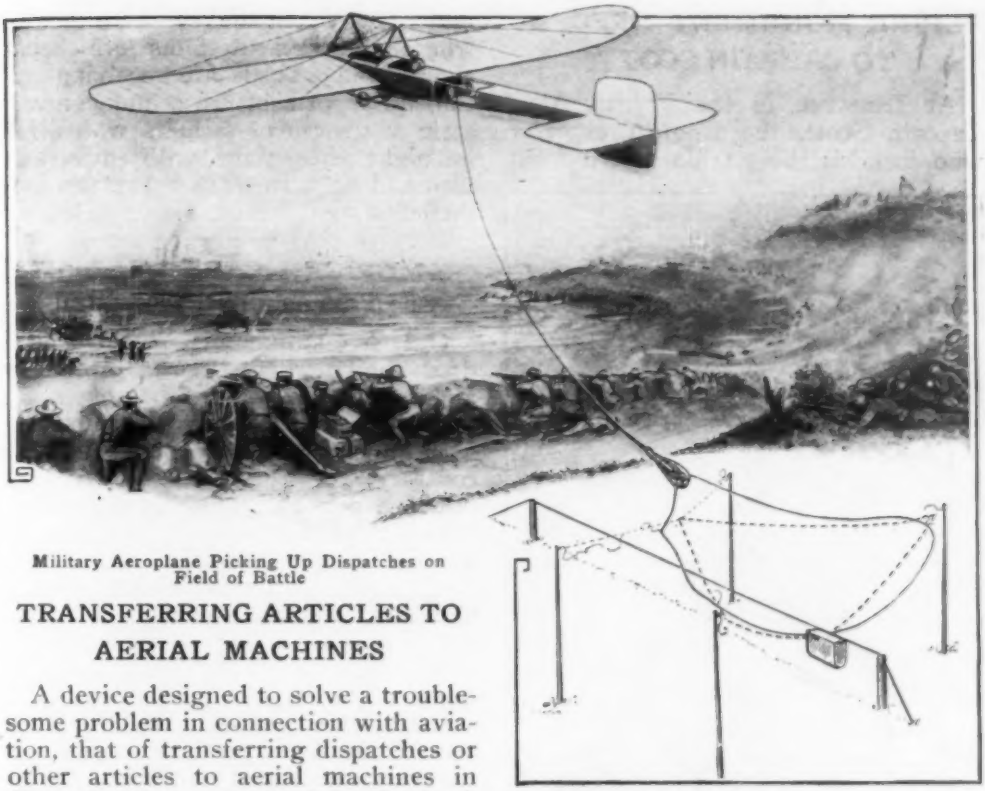
TANGOING BY MACHINERY NEWEST FEATURE

The present popularity of dancing is the excuse for the invention of a mechanical device for use in amusement parks, by means of which a couple, while riding on a small car, are made to revolve, dip, glide and whirl much as dancers do on a ballroom floor in the newer dances. A door admits to a wire-screened basket, firmly supported upon a platform, which itself rests upon springs connected with the truck. The car is equipped with an electric motor attached and geared to the rear axle. The front wheels are mounted upon a separate and pivoted truck, so that the car takes short curves readily on the special track provided for it. An arrangement of cams and springs gives the car the "tango" motion.

New Dancing Car for Amusement Parks

WORKING MODEL OF CANAL FOR SAN FRANCISCO

The government will exhibit a working model of the Panama Canal at the exposition at San Francisco. The Isthmian Canal Commission has been given $60,000 for the construction of the model, which will be built to scale, and will be complete in all its parts, permitting the passage of toy boats.



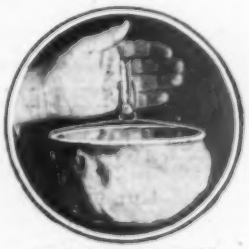
Military Aeroplane Picking Up Dispatches on Field of Battle

TRANSFERRING ARTICLES TO AERIAL MACHINES

A device designed to solve a troublesome problem in connection with aviation, that of transferring dispatches or other articles to aerial machines in flight, has been patented in England. This device consists of a grapnel, suspended from the aerial machine by a cable, which engages a loop attached to a pannier in which the article is placed. The pannier is carried on a float, or trolley, so that it may be trailed for a short distance before it is hauled up. The cable is operated by a winding drum on the aerial machine, which is put in action automatically by the initial pull of the cable when it engages the load. Danger to the machine is prevented by the slipping of the friction clutch in the winding drum when the winding stress reaches a certain maximum, while if this stress continues, the cable unwinds freely from the drum and falls to the ground. The loop to which the pannier is attached is held extended by being lightly attached to posts, as shown in the illustration. This loop is so connected to the pannier as to operate a brake on the trolley, if it tends to underrun the machine. For use at sea, the stores or dispatches are placed on a float carrier, and the loop is suspended on spars extending from the ship.

HANDY BAG FOR PICKING CHERRIES

A Michigan mail carrier has invented the contrivance illustrated to aid him in picking cherries. It is a canvas bag, held open by a wooden or metal ring at the top. A small leather strap passes around three fingers of the left hand, and from this the bag is suspended by a hook. Most growers who still adopt the plan of cutting the stems of the cherries with small scissors find the new bag a great convenience. It is patented.



ALPINE MONUMENT ERECTED TO CAPTAIN SCOTT

At Lautaret, in the French Alps, Captain Scott, the English explorer who lost his life on his return from

French Scientist Raises Monument to Former Pupil

the South Pole, took his first lessons in ice scaling. Here a simple monument has just been erected by his old instructor. It consists of stones heaped in the form of a rude pyramid, and surmounted by a pole. A wooden framework holds the loose rock in place amid the drifting snows.

AGRICULTURAL FILMS FOR THE FARMERS

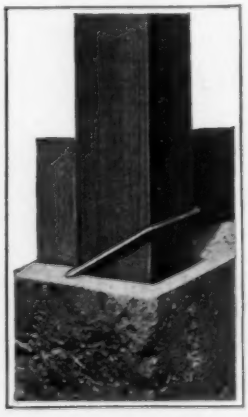
The Department of Agriculture is presenting series of films depicting in detail the right way to handle many problems of farm management. Through the Rural Organization Service these films are being sent throughout the country for the instruction of farmers in such subjects as chicken raising, bee culture, rice and cotton planting, and many phases of the dairy industry. From the southern states, where the present films are being shown, the officials are receiving optimistic reports of large and enthusiastic audiences of farmers who drive in, night after night, with their families and help, to learn better farming methods.

AMERICAN CARS LEAD IN SELF-STARTING FEATURE

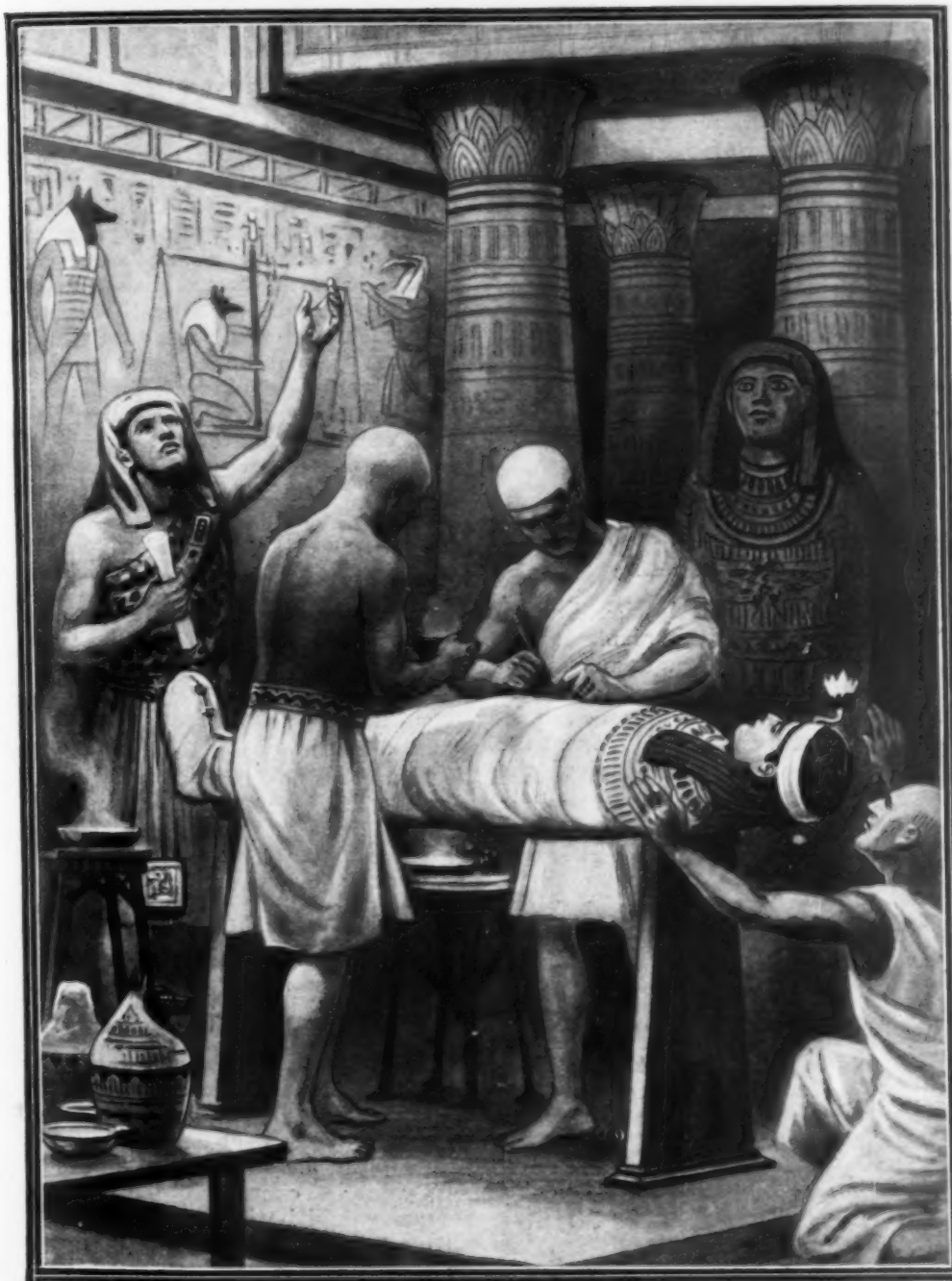
Only five automobiles in every hundred shown at the recent American automobile shows were without some form of engine-starting equipment. The Paris and London shows, on the contrary, reversed these figures, and but five per cent of the automobiles shown there had some form of engine starter. At the American show, 87 per cent of cars produced in this country had electric starting devices as standard equipment, with provision made in the construction of the chassis for adequately housing the mechanism. Air starters were seen on about four per cent of the American-built cars, while the acetylene type of starter was shown on but one per cent of the cars.

FASTENING WOODEN POST TO CONCRETE

The problem of fastening wooden posts to a concrete wall has been solved in one instance by the use of U-bars firmly imbedded in the concrete, while their loop encircles the post at an angle. The U-bar may be, and often is, homemade. It holds as well when turned out by the village blacksmith as when bought from a city supply house, the main thing being that it holds the post rigidly in place.



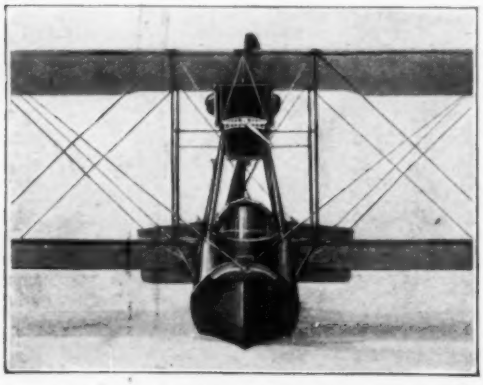
MANUFACTURING A MUMMY IN ANCIENT EGYPT



THE ancient Egyptians preserved the bodies of their dead in order to give the soul a home on its return to earth. The preservative climate of Egypt and the use of nitron, asphaltum and gums enabled mummifiers to achieve marvelous results, hundreds of thousands of mummies having been found which were embalmed thousands of years ago. Originally intended as a ceremony only for royalty, the custom spread to include the courtiers, and then the servants and slaves of the latter, as well as the royal guard. Bodies were wrapped in strips of linen, smeared with asphaltum. Within the cavities were placed pungent spices, and designs were painted upon the outer wrappings. The mummy was then placed in a case carved to represent a human figure.

NEW FLYING BOAT HAS INCLOSED CABIN

Satisfactory tests have just been made on Lake Keuka, N. Y., of a flying boat, differing from the usual type



Flying Boat for Cruising

in that it has an entirely closed cabin. An oddly shaped hull, planked with crotch mahogany, is longer and higher in the bow, the seats are arranged in tandem, and celluloid windows protect the passengers and pilot from the elements. Indeed, the body of the boat is designed to afford adequate shelter, even if waves dash entirely over the craft. During the tests, a speed of from 60 to 65 miles an hour was attained.

CURING HAY ARTIFICIALLY WITH STEAM HEAT

Experiments extending over five years have demonstrated that hay cured by steam heat is preferred by stock to the sun-dried article, and chemical analysis confirms this practical test by showing that the percentage of protein is higher in artificially cured hay. The method calls for a complete steam plant, where steam heat is secured from the exhaust of the engine. The freshly mown hay is drawn under a shed and pitched onto conveyor belts which carry it to the top of the building used in steam drying. The hay is carried back and forth over steam coils underneath the conveyors seven times. An even heat of 240° F. is maintained, and the hay remains on the conveyor from 20 to 40 minutes. When it is discharged it is well cured, of better color, and the leaves are preserved in better shape than hay cured in the fields in the ordinary way. The method lends itself to coöperative action among farmers.

Farmers may Make Hay Whether Sun Shines or Not

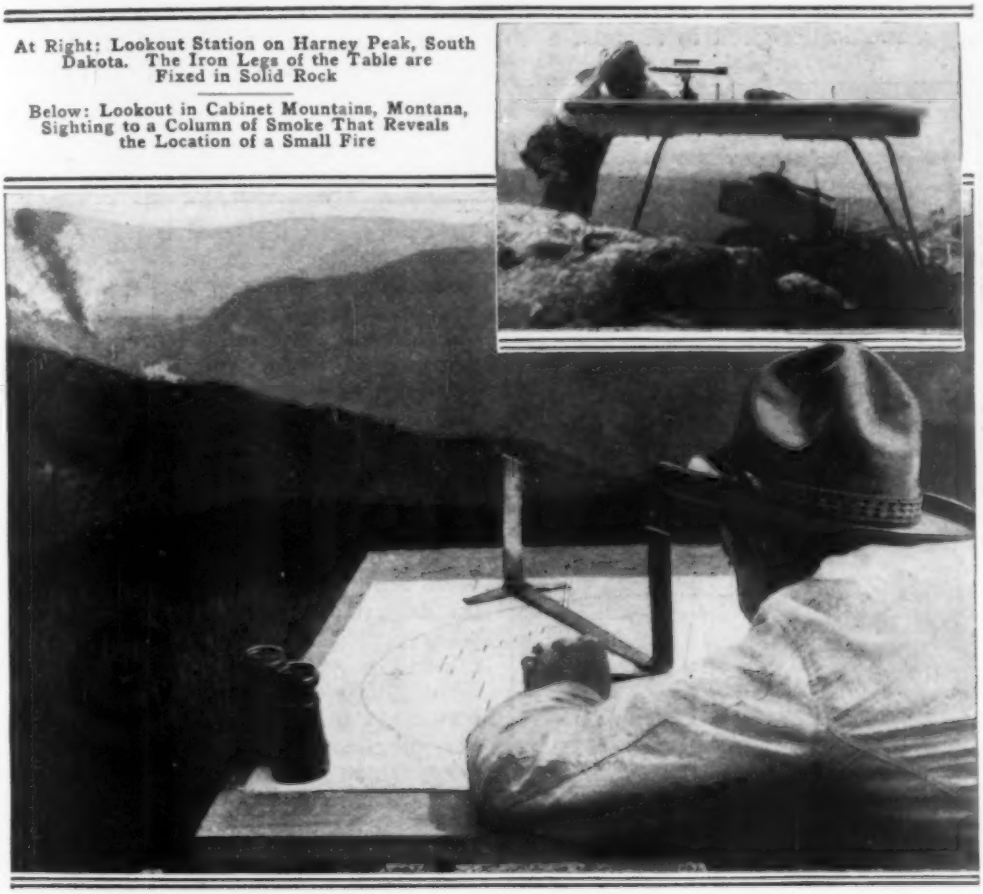
THUMB PRINT TO IDENTIFY WORKS OF ART

Fraudulent copying of works of art and passing them as genuine simply because of a forged signature upon the canvas, has led several French artists to agree that henceforth they will sign their works in thumb print, in order to prevent such frauds. The idea originated with one of the professors of the Sorbonne, the chief French center of learning. It is proposed that the artist shall press his thumb upon the moist paint in some inconspicuous part of the canvas. Sculptors will make their mark on statues by first impressing their thumb in gold powder for bronze statues, or in dye for marble, while engravers could put the print on the back of engravings. The artists will deposit impressions of their thumb prints with the minister of fine arts, and catalogs containing photographs thereof would be in the possession of all dealers. Identification would thus be easy, for even the cleverest swindlers would be unable exactly to duplicate the print of a master's thumb.

¶The total money in circulation in the United States at the beginning of 1914 was $3,447,368,355.

WATCHING FOR FIRES IN MOUNTAIN FORESTS

Every man in the National Forest Service knows what it means to let a fire get a good start. A few hours spent in fighting a small fire may save days of the hard and dangerous work that follows when a fire is allowed to gain headway. The fire-fighting force in the national forests is therefore organized to detect and locate a fire accurately, the moment the first wisp of smoke appears, as well as to get to it and start fighting it without delay. In the mountain forests lookouts are placed on peaks that command extensive views of the forest, a constant watch is kept during the danger season by men equipped with binoculars, and in this way the first indication of a fire is discovered. Each lookout station is equipped with a plane table covered with a map on which a large circle, divided into 360 degrees, is drawn. Over this is placed a straightedge which carries two standards for sighting, the straightedge being pivoted at the center of the circle. When a fire is discovered this instrument is sighted to it and the angle is read at the point where the straight edge intersects the circle. This angular measurement is telephoned to the supervisor's office, and, in combination with a similar measurement from another lookout, serves to locate the fire definitely on the map in the supervisor's office, the



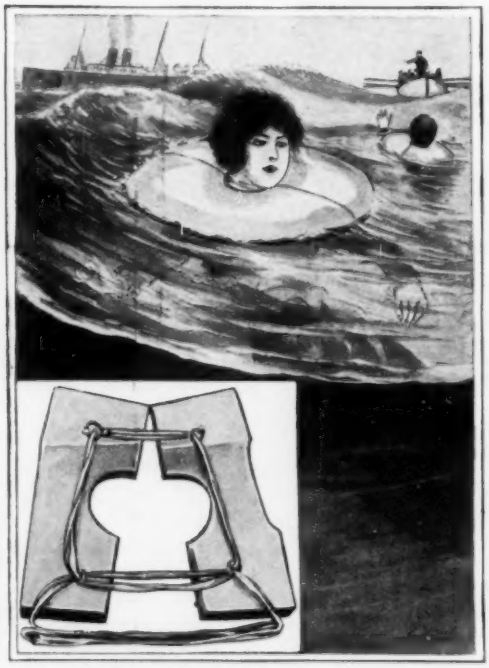
At Right: Lookout Station on Harney Peak, South Dakota. The Iron Legs of the Table are Fixed in Solid Rock

Below: Lookout in Cabinet Mountains, Montana, Sighting to a Column of Smoke That Reveals the Location of a Small Fire

location being found by drawing out the sight lines from the two lookouts to an intersection with each other.

LIFE PRESERVER THAT FITS THE NECK

A cork life preserver which fits around the neck rather than under the arms and is designed to support even



A Cork Life Preserver Which Fits around the Neck and will Support an Unconscious Person

an unconscious person has recently been placed on the market. The advantage claimed for the new life-saving device is that it does not permit the body to overturn and keeps the head above water under any circumstances. The life preserver is made of block cork covered with cotton drill and has under-arm straps arranged so that the body's weight is carried from rust-proof burrs on top.

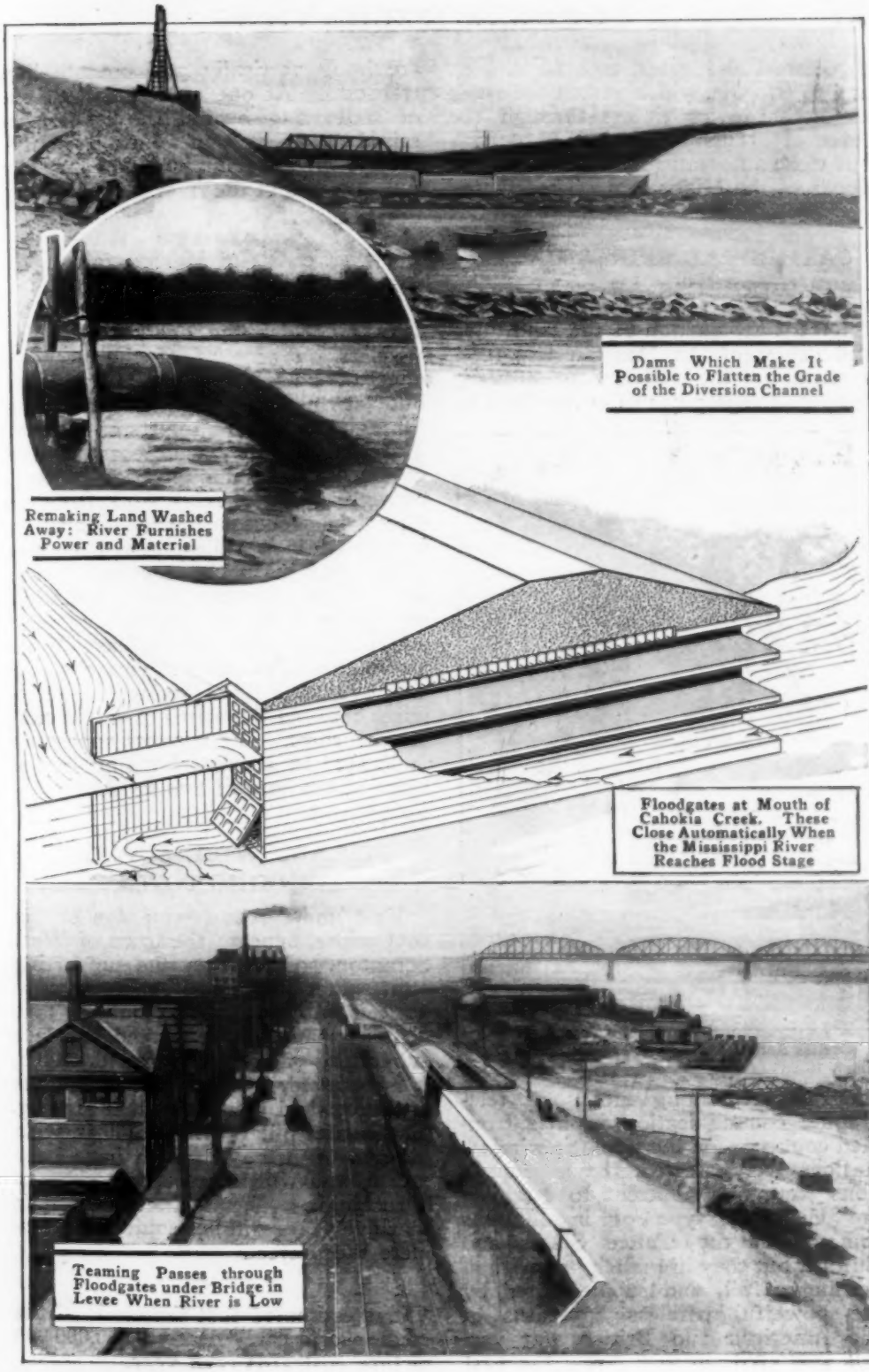
¶As the result of several bad explosions due to sparks, most mine owners now forbid the use of a trolley motor for hauling a car containing powder.

PROTECTING BOTTOM LANDS FROM FLOOD

Almost every kind of problem that can be met with in flood-protection work was encountered in the work of leveeing and draining the 150 square miles of Mississippi River bottom lands that spread out in a fan-shaped area to the north, east and south of East St. Louis, Ill. This district lies along the east side of the Mississippi River. Through the middle of it flows a small stream known as Cahokia Creek, which drains a 200-square-mile section of upland lying to the east and northeast. In time of flood this ordinarily insignificant stream brings down enormous quantities of water from the hills and becomes almost as great a problem as the Mississippi itself. When the two are in flood at the same time the result is likely to be a disastrous overflow, such as that of 1903 when many lives and millions of dollars worth of property were destroyed. Protection work has just been completed at a cost of $6,500,000.

Although about 31 miles of levee were required, the problem of holding back the flood waters of the Mississippi was comparatively simple. The real difficulty lay in protecting the district from floods in Cahokia Creek. This was accomplished by means of a diversion channel, 100 ft. wide and 20 ft. deep, which taps the creek at the point where it comes out of the hills and carries its waters west along the northern edge of the district to the Mississippi. This channel is much shorter than the old, and if built on a straight grade, would cause the water to flow at a dangerously high velocity. To overcome this, two dams, both heavily protected with concrete and riprap, were placed near the lower end of the channel, and with the direct fall thus provided it was possible to build the remainder of the channel on a safe grade of 2 ft. per mile.

Cahokia Creek is still required to carry to the river most of the local drainage within the district. Where this creek passes through the levee are



Dams Which Make It Possible to Flatten the Grade of the Diversion Channel

Remaking Land Washed Away: River Furnishes Power and Material

Floodgates at Mouth of Cahokia Creek. These Close Automatically When the Mississippi River Reaches Flood Stage

Teaming Passes through Floodgates under Bridge in Levee When River is Low

three steel floodgates, each 20 ft. high and 25 ft. wide, which permit the creek to discharge its waters through the levee at ordinary stages of the river, but close automatically to shut out the floods of the Mississippi. These gates are hung vertically and operate like transoms. At one point a large area of land lying behind the levee was raised an average of 25 ft. by a hydraulic dredge pumping sand and silt from the bed of the river.

CATHEDRAL SPIRES CARRY WIRELESS AERIALS

Recent destruction of the land lines and cables of the Mexican telegraph system by the rebels has brought wireless telegraphy to the forefront as

Wireless Aerials Strung between the Spires of a Mexican Cathedral

the only remaining means of telegraphic communication in that troubled country. At the time the wireless stations were erected, the appropriations were not sufficient to establish the elaborate type of installations common in the United States and Europe, but they are much better than nothing at all, and supplemented by the powerful wireless apparatus of the American and British war vessels scattered up and down the east and west coasts of Mexico, fairly satisfactory results are obtained.

The intense heat of the tropical days precludes the operation of the wireless on account of the peculiar effect of the sun upon the atmosphere, but at night, messages are sent through the air to all parts of Mexico. Mazatlan, on the Pacific coast, is one of the busiest communication centers, as a great deal of relay work from all directions focuses there. Mazatlan is located in a valley, and a serious obstacle arose in the question of the aerial. To operate a wireless station with any degree of efficiency, the aerial wires must be at least 75 ft. above the instruments. This obstacle was overcome by stringing the aerial wires between the spires of the Mazatlan cathedral. The wireless apparatus is located in a small building in the plaza at the base of this structure.

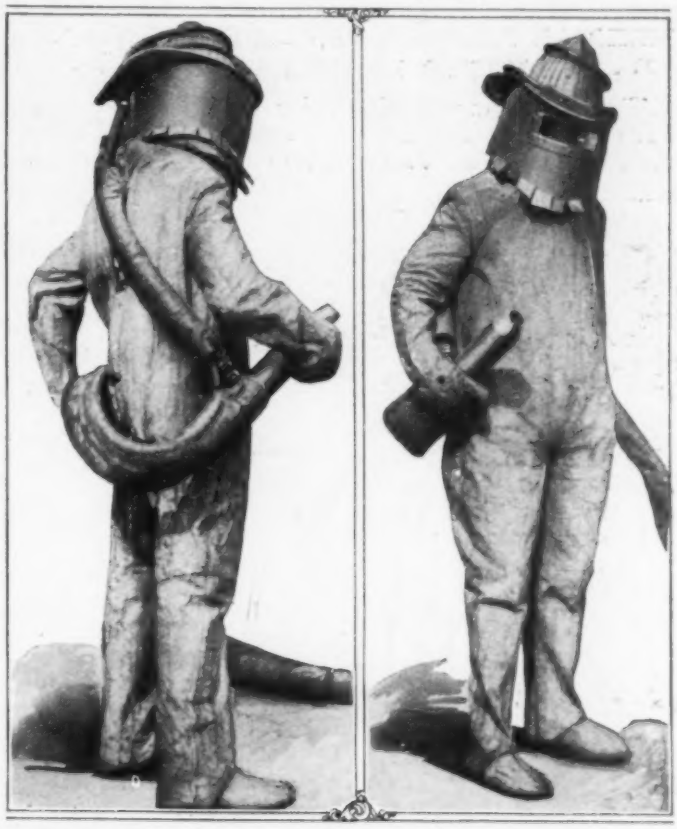
PILLARS WILL SUPPORT SINKING TOWN

Vast underground workings of big coal mines, beneath the town of West Scranton, so weakened the supporting strata that alarming sinkages were noticed within the city limits. Two coal companies have agreed to place supporting pillars underground, which, it is believed, will stop the dangerous condition, and prevent further sinking. The barrier pillars will be 100 ft. wide in each of 10 veins which have been mined, and will inclose three sides of a rectangle. The engineers estimate that five years will be required to complete the project.

¶It is estimated that the mails of the whole world carry nearly 6,000,000,000 picture postcards each year.

USING AN OIL FILM TO PREVENT FOG

The city of Lyons, in the south of France, has long been subject to local fogs, which investigation has traced to the evaporation from the two important rivers which join at that point. French scientists who have studied the conditions, propose to float a thin film of oil over the surface of these rivers, preventing evaporation, and eliminating the humidity to which the fog is due. Sufficient funds have been provided by the municipality to experiment with various oils, in the endeavor to obtain such a combination of tenacity and resistance to wave action, as will prove of service. In practice, tow is soaked in oil and submerged in each river a distance above the city, and the oil, rising to the surface, spreads to a thinness of not more than one one-hundred-thousandth of a millimeter, a mere film, which is yet sufficient to stop evaporation of the water beneath, thus preventing fog.



Fireproof Uniform Enables Fire Fighters to Defy the Flames

SALAMANDER SUIT SCREENS FIREMEN FROM FLAME

A fireproof suit, consisting of two layers of specially prepared canvas, with space between for flowing water, has recently been invented, by which firemen are enabled to penetrate to the very heart of quite an intense fire without danger. Water connection with the suit is furnished by a half-inch connection with the fire hose, and a perforated ring of brass encircles the neck through which the water flows down through the walls of the double suiting, and out at the finger tips and soles of the feet. Another perforated ring, surmounting the metal helmet, showers water continually over the head and shoulders. Plenty of fresh air is forced into the helmet from an outside supply, pumped by a water motor through a ½-in. line of hose spliced onto the fire hose, the motor and air hose being attached to a special section of regulation fire hose which is coupled to the main line. The novel suit can be donned in two minutes, and as it weighs but 25 lb., the wearer is not hampered by the weight. The helmet has mica eyepieces, and its lower part fits under the suit about the neck, making it impossible for steam, smoke or hot gases to penetrate.

The advantage of being able to direct the water directly upon the fire, instead of being obliged to stand at a great distance, is so obvious that the new appliance is interesting fire chiefs the country over.

MEXICAN RAINCOAT MADE OF PALMETTO LEAVES

The mountaineers of Mexico who have to endure the torrential rains of their climate, wear a serviceable cover-

Mexican Rurale in Palmetto Raincoat

ing made of palmetto leaves, which proves thoroughly waterproof, and is cheaply constructed. A closely woven cloak hung from the shoulders, with a fringe of leaves extending downward from the collar, protects the body of the wearer, while the great hat, its brim turned down, makes a cupola for the head, and the whole outfit sheds water like a duck. Another advantage is that the palmetto leaves blend so perfectly with the grass and soil, that the wearer is inconspicuous and makes a poor target in a land where targets are perforated on the slightest provocation. The photograph is that of a member of the "rurales," or constabulary, of Mexico.

MEMBERS OF CONGRESS MAY VOTE BY ELECTRICITY

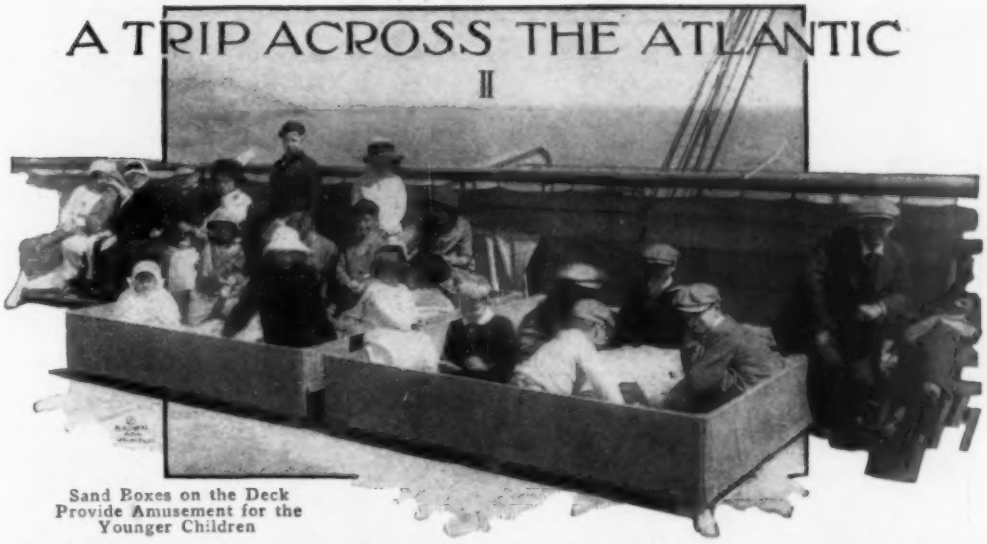
A subcommittee of the House of Representatives is considering a proposed system of recording and registering the votes of members by means of an electrical device, operated by a series of buttons placed on the desk of each member. A member of Congress from New Jersey, himself an electrician, has evolved the system, which seeks to eliminate the waste of time necessitated by the long roll calls, in which not less than 40 minutes is consumed, while by the installation of the new system not more than five minutes will be necessary to record and tabulate the vote and announce the result. One of Thomas A. Edison's earliest inventions was a device for recording votes electrically, but at the time it was made, more than 40 years ago, he could get no encouragement for its development.

$10,000 PRIZE FOR NEW TIRE MATERIAL

A nonrubber automobile tire which will be cheaper than the present kind, yet possess certain standard resiliency and durability, is being sought by the war department of Austria, and a prize of $10,000 will be awarded to the person who fulfills the conditions, submitting a small or working-size model suitable for motor freight wagons, on or before June 30, of this year. Besides the specific attributes of pure rubber, such as adhesiveness and elasticity, the new material must not be heavier than pure rubber, and it must be more economical in use.

A TRIP ACROSS THE ATLANTIC

II



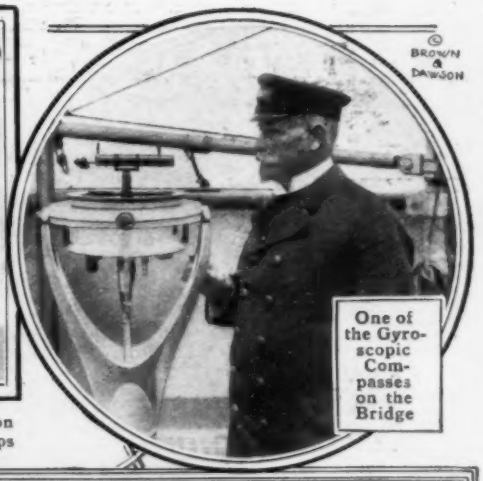
Sand Boxes on the Deck Provide Amusement for the Younger Children

IN THIS second series of photographs illustrating a voyage across the Atlantic in a great modern passenger steamship, some of the more interesting and elaborate provisions for the safety, comfort and entertainment of the passengers are shown. Today ocean travel is more luxurious than ever before, but its cost has not increased proportionally to the accommodations provided.

Few people realize how much less expensive it is to travel by sea than on land. The first-class railroad rate from Chicago to San Francisco, for instance, is $59.75, to which must be added the cost of a Pullman berth and of meals en route. This figures out at nearly 4¾ cents a mile for transportation alone, while the first-class rate for the 3,300 miles between New York and Southampton, which includes both meals and comfortable sleeping quarters, amounts to less than four cents a mile, and the second-class rate on the largest ships takes the traveler across the ocean, feeds him and provides his bed, all for less than 2½ cents a mile.

This View of One of the First-Class Suites Gives an Idea of the Luxury Attainable in Modern Travel

"All's Well." The Lookout in the "Crow's Nest" on the Foremast Watches for Icebergs and Other Ships

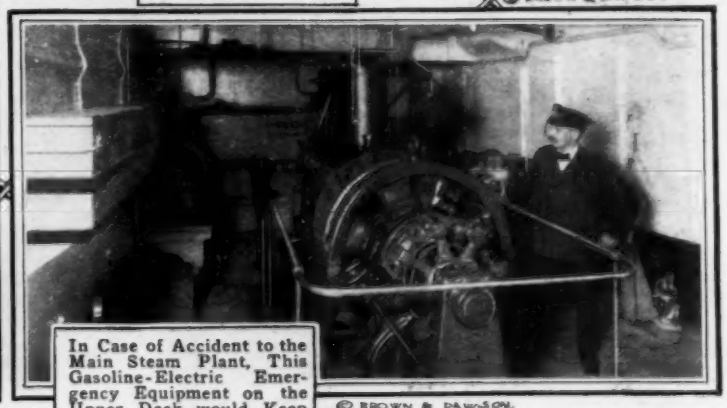


One of the Gyroscopic Compasses on the Bridge

One Spot Where Passengers are Not Welcome: The Bridge, from Which the Operation of the Big Ship is Directed. All Essential Controls are Electrical

The Sea Post Office, Where American and European Postal Clerks Route All Mail

A Telephone Booth: One may Talk to Any Part of the Ship



In Case of Accident to the Main Steam Plant, This Gasoline-Electric Emergency Equipment on the Upper Deck would Keep Lights and Wireless Going

BROWN AND DAWSON PHOTO

Third-Class Passengers are Not Barred from the Comforts of Deck Chairs

BROWN AND DAWSON PHOTO

A Scene in the Third-Class Smoking Room—Plain but Comfortable

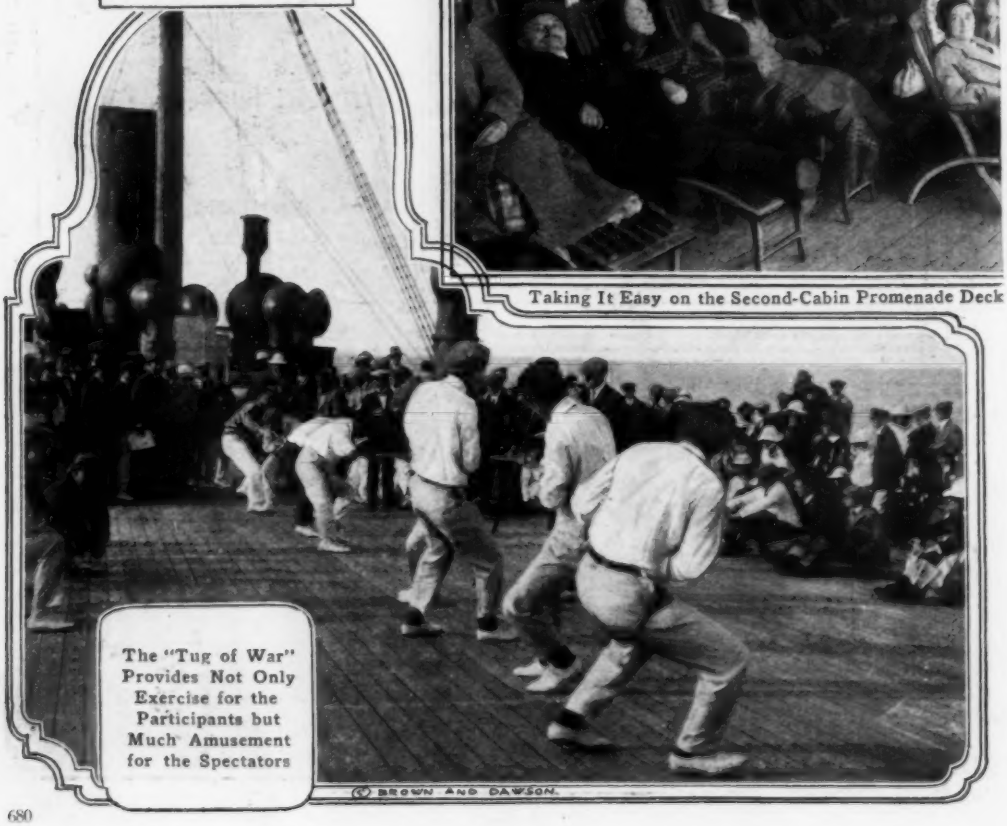
© BROWN AND DAWSON

A Concert Evening in the Main Saloon

© BROWN AND DAWSON

Sports and Games Break the Monotony of the Days at Sea: A Three-Legged Race on Deck

Taking It Easy on the Second-Cabin Promenade Deck



The "Tug of War" Provides Not Only Exercise for the Participants but Much Amusement for the Spectators

© BROWN AND DAWSON.

PHOTO BY BROWN AND DAWSON

First-Cabin Passengers Watching a Girls' Potato Race on a Sunny Day at Sea

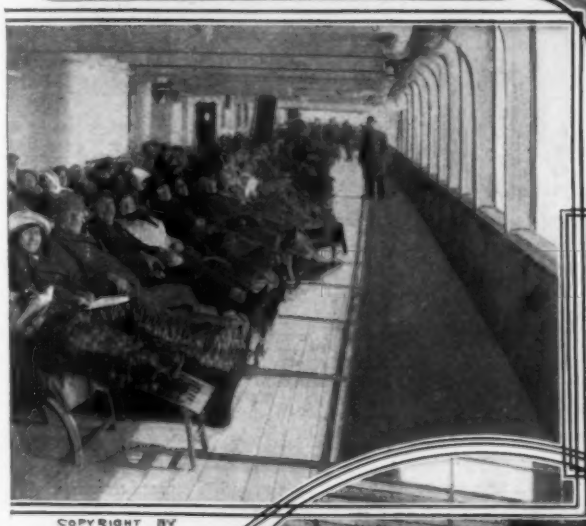


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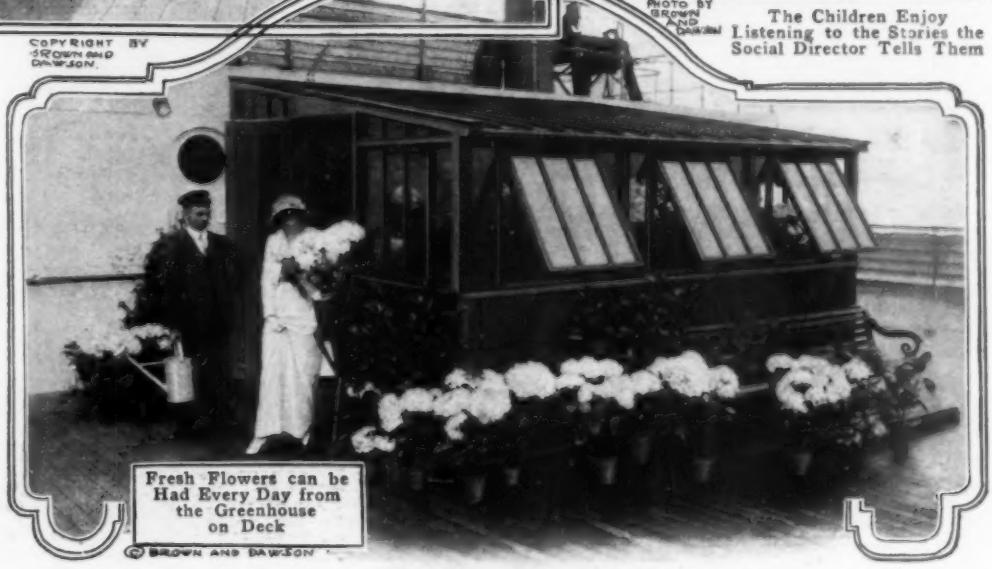
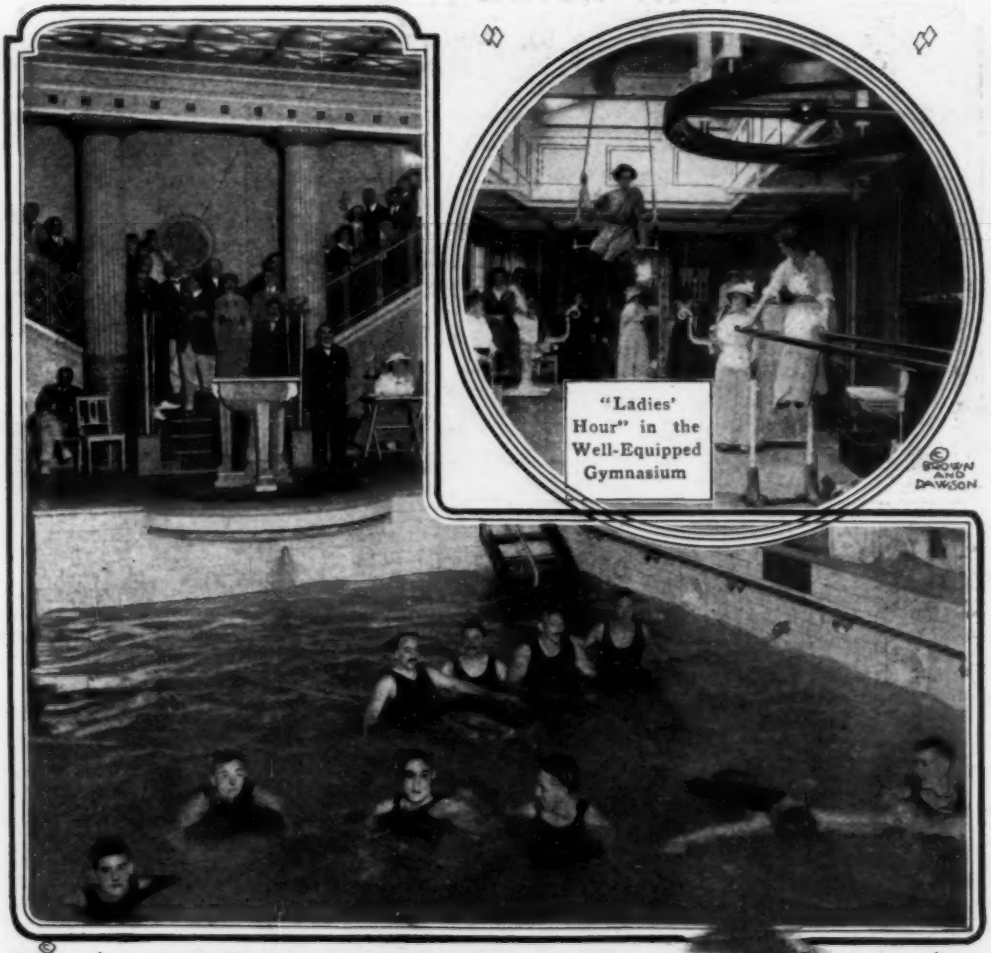
PHOTO BY BROWN AND DAWSON

The Children Enjoy Listening to the Stories the Social Director Tells Them



Fresh Flowers can be Had Every Day from the Greenhouse on Deck

© BROWN AND DAWSON



"Ladies' Hour" in the Well-Equipped Gymnasium

© BROWN AND DAWSON

© BROWN AND DAWSON

In the Marble Swimming Pool of the Roman Baths

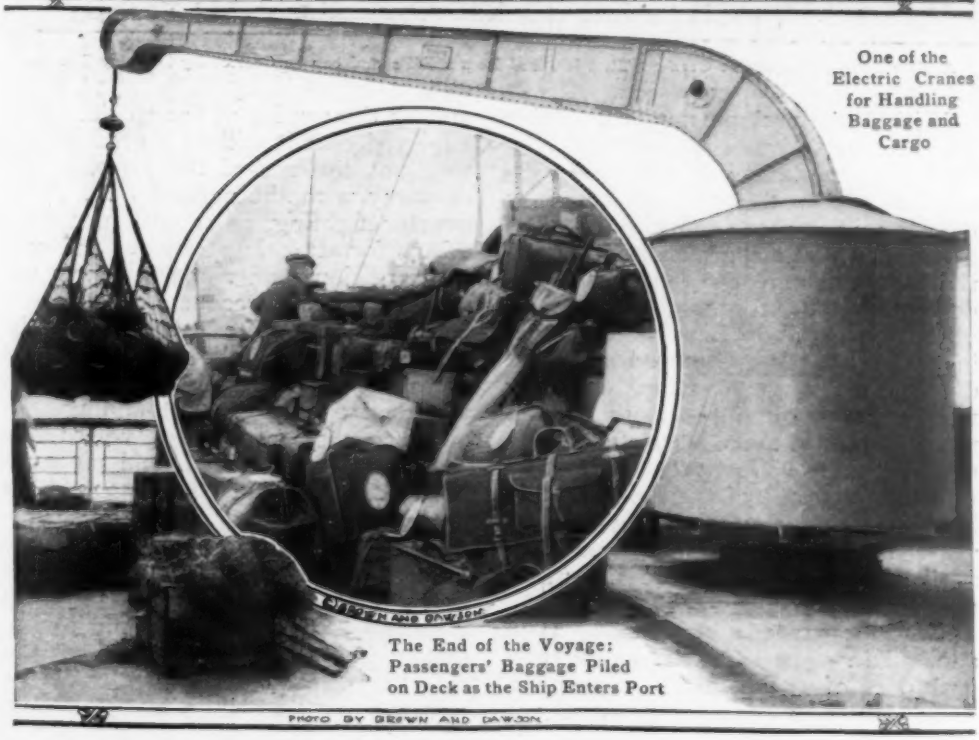
The Revival of Dancing is Recognized in the Provision of This Ballroom for the Use of Passengers

© BROWN & DAWSON

The After Deck Gives Fresh Air and Quiet

Luncheons between Meals and Afternoon Tea are Served by Stewards on the Decks

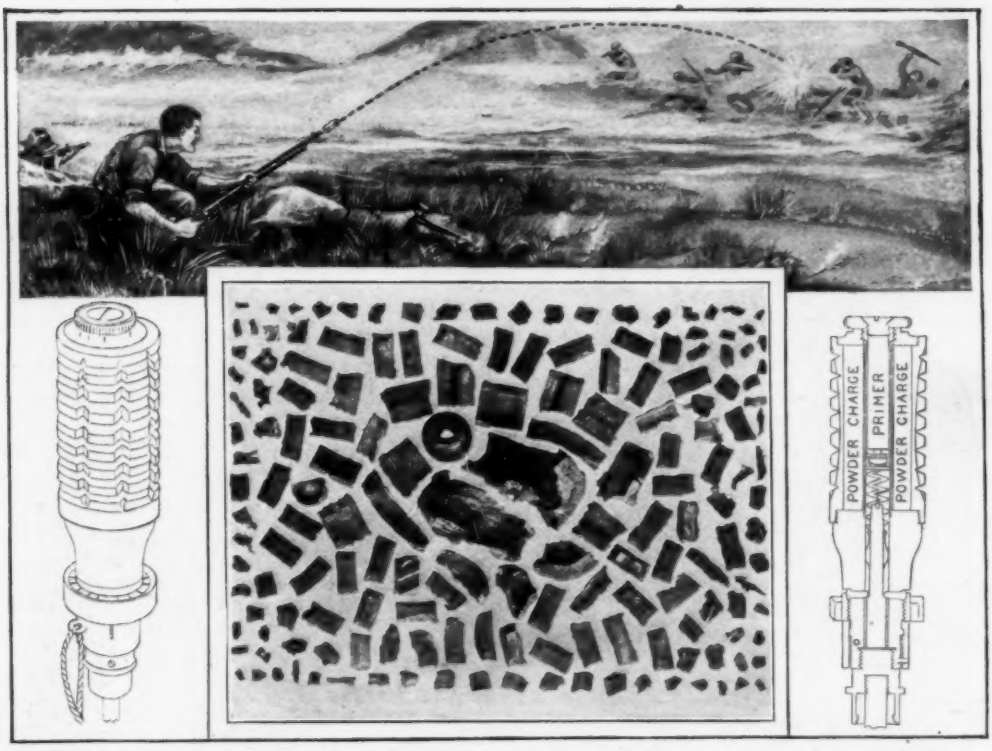
One of the Electric Cranes for Handling Baggage and Cargo



The End of the Voyage: Passengers' Baggage Piled on Deck as the Ship Enters Port

PHOTO BY BROWN AND DAWSON

GRENADE THAT IS FIRED FROM A RIFLE



A New Type of Explosive Grenade That is Fired from a Rifle and can be Carried by Infantry Troops

With the development of the rifle grenade to the point where it may be fired without danger of premature explosion and with practical certainty that it will explode when it hits the ground, even at a sharp slant, so effective an instrument of offense and defense has been provided that it is likely to bring about important changes in military tactics. Before the advent of long-range guns, when opposing troops would often get close enough to each other to make it possible to use such missiles effectively, the hand grenade was one of the indispensable implements of warfare. Now, it appears, the same implement, fired from a rifle, is to become more important than ever.

The rifle grenade has already been adopted in some countries as an integral part of the soldier's equipment, and is likely to come into general use among the armies of the world. It is expected that it will to a great extent supplant the use of the bayonet and do away with the necessity for close-quarter fighting, as it will provide a means for attacking trenches and covered positions and rendering them untenable without recourse to hand-to-hand combat. The grenades can be fired singly or in volleys and the effect of volley firing with such weapons would probably be astounding. In hilly country especially, where the bringing into action of field pieces is extremely difficult, the use of the grenade will prove of incalculable benefit to the troops equipped with it.

This new man-killing device consists of a cylindrical metal case with a rod projecting from one end for insertion in the barrel of the rifle. Inside the metal case, which is deeply serrated so that it will break into

numerous fragments when exploded, is a cylindrical mass of some explosive. Through the center of the explosive is a hole for the detonator and the firing pin, which are arranged so that the pin will be thrown against the detonator and will explode it when the grenade strikes the ground or other object. The firing pin is provided with a shoulder near the lower end, and is held rigidly in place by transverse pins that bear against this shoulder. When the grenade is fired from the rifle the impact against the air sets a small vane wheel in motion, which draws the pins out of contact with the shoulder and releases the firing pin, but not until the grenade has reached a point 15 yd. from the muzzle of the gun. The firing pin is then free to plunge against the detonator and explode it the instant the grenade strikes any object. In this way all danger of premature or accidental explosion is prevented, while the grenade is made a reliable and effective weapon for use against the enemy. For effective work, especially at close range, the rifle is fired at a high angle with a resulting dropping fire, after the manner of a mortar, the desired angle of elevation being obtained by means of a combined sight and angle-measuring instrument fitted to the rifle stock just below the back sight.

LIFEBOATS ARE EQUIPPED WITH WIRELESS

The latest application of wireless as an aid to navigation is the equipment of the lifeboats of the new transatlantic liner "Aquitania" with Marconi apparatus. With a skillful operator on board and with the storage batteries well charged, there need now be no danger of a lifeboat loaded with refugees drifting away, out of the steamship lanes, to dreadful death. The rapid increase of wireless operators may make this plan of high service, although its complete utilization calls for the extreme limit of efficiency and preparedness in the ship's company.

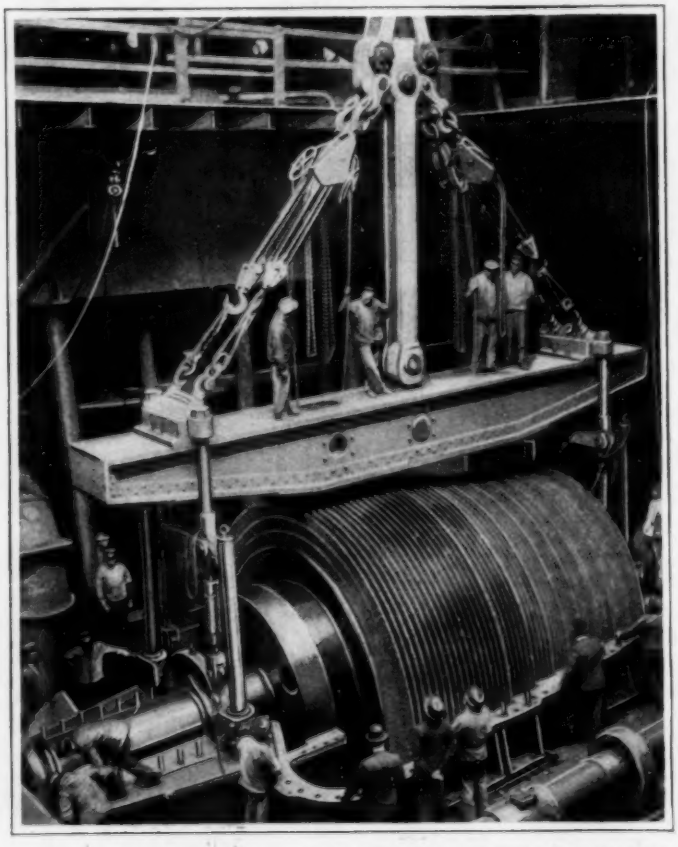
IRON SPIKES GIVE AID IN SCALING THE ALPS

The difficulties encountered by Alpine climbers make the ascent of the famous peaks an arduous undertaking, even under the most favorable circumstances. In some dangerous spots helps in the shape of iron steps, or ladders formed by driving spikes into the steep sides of the mountain, are resorted to. Even with these aids, the men and women who attempt the feat must be prepared for strenuous exertions. The way to the top is difficult and often dangerous. Many lives are lost every year. The view given here shows how the iron spikes are driven into a mountain side.

Alpine Climbers on a Stairway of Spikes

POWERFUL TURBINES OF THE "VATERLAND"

The most powerful steam turbines ever installed aboard ship are those for propelling the "Vaterland," the largest ship in the world, which is now being completed at Hamburg, Germany. The turbines and the last of the other heavy machinery are being placed in position and it is expected that this vessel will make its first trip across the Atlantic early this summer. The turbines are of the Parsons type. Some idea of their size may be obtained from the illustration showing one of the rotors being lowered into position in the ship. This rotor is 17½ ft. long and 17 ft. in diameter, weighs



Lowering a 135-Ton Rotor into the Hold of the "Vaterland." The Turbine of Which This is a Part is Capable of Developing over 22,000 Horsepower

135 tons, and is studded with thousands of blades varying in length from the fraction of an inch at the small end to nearly two feet at the large end of the turbine. The turbine of which this rotor is a part is capable of developing over 22,000 hp. The "Vaterland" is a sister ship of the "Imperator," which entered the transatlantic service in the summer of 1913, but surpasses that ship in every dimension, being 950 ft. in length, 100 ft. in beam, and having a carrying capacity of 58,000 tons.

TECHNICAL TERMS USED BY ROPE MAKERS

With the average man a rope is simply a rope. But among makers, as well as among sailors and other expert users, a number of exact technical terms are in use for distinguishing the different parts and types of this common commodity. One curious feature is that fiber and steel ropes are measured in different ways. When the size of a fiber rope is given, the dimension refers to the circumference, while with a steel cable it refers to the diameter. Thus a 5-in. fiber rope is one having a diameter of about $1\frac{9}{16}$ in. In the manufacture of fiber rope, three or more strands twisted together form what is called a common-laid rope. Each of these strands, in turn, has been made by twisting together two or more yarns or threads, the latter consisting simply of a number of fibers twisted firmly together. The strand has a twist opposite to that of the yarns or threads, while the rope has a twist opposite to that of the strands

Dredging a Channel through the Cucaracha Slide in the Panama Canal

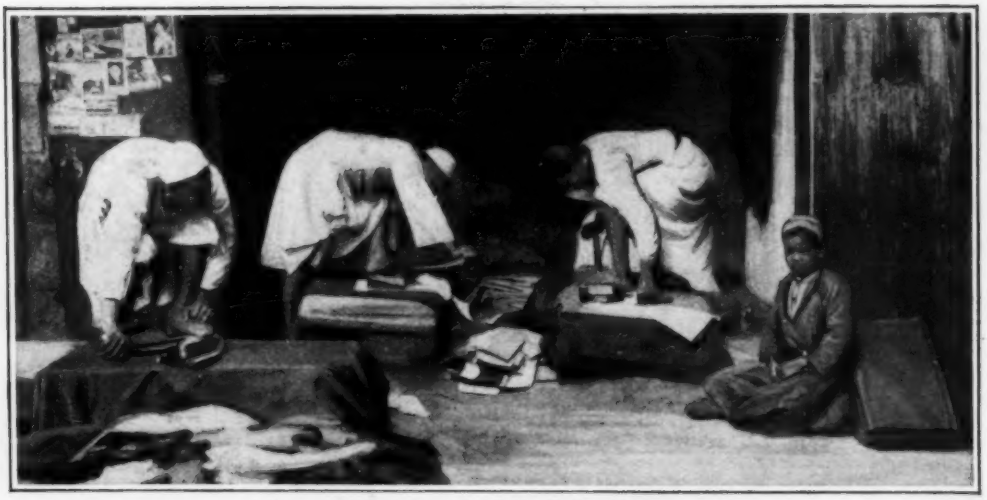
that compose it. The degree of twist is designated as the lay, which is a term used for giving the number of twists per foot of rope. The more twists to the foot, the harder will be the rope, and the lay is therefore often given as varying degrees of hard and soft. Where the strands are twisted together in a clockwise direction the resulting rope is right-laid. If the twist is in the opposite direction the rope is left-laid. A hawser and a hawser-laid rope are not the same thing. The first is simply a large common-laid rope suitable for towing, while the hawser-laid or cable-laid rope is made of three or four common-laid ropes twisted together. A piece of rope 1,200 ft. long is called a coil, while one half that length is called a half-coil.

SLIDE THAT FILLED THE MAW OF PANAMA

Cucaracha slide has been the bane of Panama. Lying toward the southern end of Culebra Cut, the earth here has slipped and slid, as the canal was deepened and widened, until the so-called "angle of repose" was reached, where it was supposed no more movement would take place. But the pressure of the masses of earth, at Gold Hill and on the opposite side of the canal, was so great that apparently the softer under strata of earth flowed out toward the canal, and an earthen glacier moved hundreds of thousands of cubic yards into the cut. The photograph gives an accurate view of the slide, and shows the dredges attacking it from either end. In less than two months the slide had been cleared sufficiently to permit the passing of vessels.

COMPACT SELF-HEATING SOLDERING IRON

A particularly compact self-heating soldering iron is here shown. The fuel is carried in the handle. Any degree of heat may be had in a few moments, and the operating cost is about two cents a day. The iron can be converted into a torch by attaching a brazing burner to the generator, and may also be used as a branding iron.



Curious Sight in Cairo Tailor Shop

CHEAP WAY OF BUILDING CLOTHESLINE POST

A good example of economical construction is shown in a concrete clothesline post made by an enterprising suburbanite. The cement and crushed stone were obtained from the surplus left after building a sidewalk, while the reinforcing consists of old wagon end-gate rods dug out of a scrap heap. The form for molding the post was made from old boards that were lying about the place, and the work was done by the owner. One of the end-gate rods was allowed to stick out at the top, as shown, and serves as a hold for the clothesline.

CAIRO TAILORS IRON WITH THEIR FEET

Of all the curious sights marked by travelers in the East, none occasions more comment than the strange custom observed in the bazars of Cairo, where tailors still use their feet in ironing and pressing clothing. A broad flatiron with a long handle is used, and a block of wood is fitted over the hot iron, upon which the tailor places his foot. He manipulates the iron by means of the iron handle. The posture assumed by these workmen appears to be awkward in the extreme, but it seems to cause them no inconvenience.

GOVERNMENT PUTS AIRMEN TO RIGID TESTS

Before granting a certificate to airmen, the U. S. Army Signal Corps requires the applicant to pass certain tests of proficiency. He must make a cross-country flight of 20 miles, or more, at a height of at least 1,000 ft. With the wind blowing not less than 15 miles an hour, he must fly for five minutes. Again he must show his proficiency by carrying a passenger to a height of 500 ft. and, on landing, bring his machine to rest not more than 150 ft. from a designated spot, with his

engine entirely shut off before reaching the ground. He must volplane to the ground from a height of 500 ft. with the engine shut off, in another test, stopping the machine within 300 ft. of some point marked by the umpires. The last test required is a military reconnaissance flight of not less than 20 miles, bringing back information concerning the lay of the land, or other specific matters upon which he is ordered to report. In this flight he must maintain an average height of 1,500 ft. above the ground.

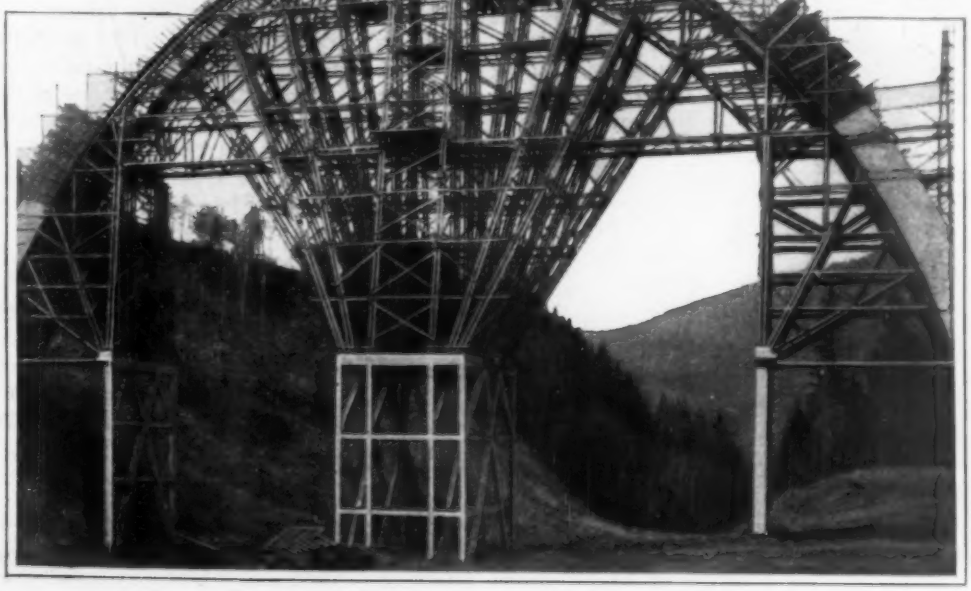
¶ Apple wood is used for making saw handles and also for making many of the so-called brier pipes.

POWERFUL SEAGOING TUG FOR PORTLAND

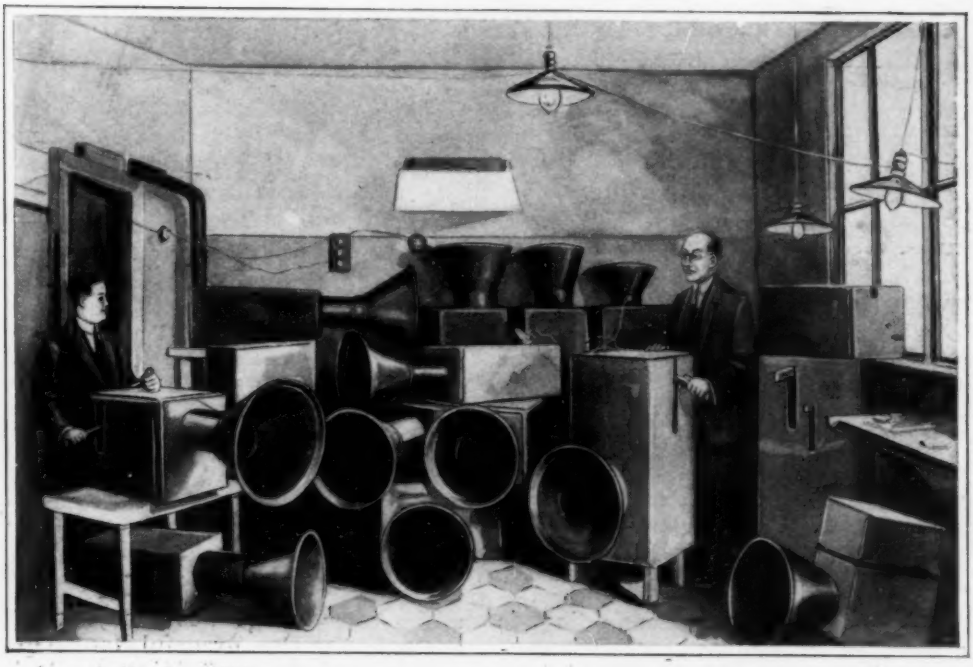
To enable the largest type of vessels and steamers to negotiate the Columbia Bar, the Port of Portland Commission has authorized the construction of a powerful tug, which will rank with the largest on the Pacific coast. The new vessel will be 165 ft. long, with 30-ft. beam and a draft of from 17 to 20 ft., and will be equipped with a triple-expansion engine of 2,000 hp., two boilers, a powerful towing machine, together with a wrecking pump and a steel boom forward, capable of lifting 15 tons. The new vessel will also have a complete wireless outfit.

LARGEST MASONRY ARCH UNDER CONSTRUCTION

A fine example of scaffolding is shown in a bridge recently constructed in Switzerland. The bridge itself is about 950 ft. long, and the central arch, shown in the photograph, is over 205 ft. high, with a span of 330 ft., making it, for the moment, at least, the largest masonry arch in the world. The graceful fan-shaped supports of the scaffolding, while by no means unusual in bridge building, are infrequently seen by others than bridge engineers and construction men. A railway will run over this bridge when completed.



Archway for Viaduct at Langwiez, Switzerland



This "Orchestra of Odors" Produces a "Symphony of Scent"

INDIAN SQUAW CARRYING FOWLS TO MARKET

The Mojave Indians, living on the outskirts of Needles, Cal., engage in poultry farming, and dispose of their product in the city markets, trudging long distances with the chickens tied to boards which the squaws carry on their heads. The fowls are bound with broad linen bands, so as not to interfere with circulation. The Indians, it is said, do not eat chickens, owing to a superstition, although they do not hesitate to sell them to people who do eat them.

¶In the foundry of one big automobile factory an average of 18,000 lb. of aluminum is used each working day.

ORCHESTRA OF ODORS FOR NEW CONCERT

An Italian has invented an electrically operated machine for propelling distinctive odors by which he purposes to produce in a Milan theater a "Symphony of Odors." The inventor insists that a degree of harmony may be sensed through the olfactory nerve not unlike that sensation we term music when sensed through the auditory nerves. Instead of a "Polonaise in E Flat," he would give a "Fantasie in Violets," or a "Nocturne in Apple Blossoms." By combining a number of these instruments, he declares he is able to produce arpeggios of perfume, harmonics of fragrance and haunting nuances of scent which will rival, if not surpass, the crashing chords and melodious phrases of master musicians.

¶Machinery and equipment used in building the Panama Canal are to be sent to Alaska for railway and coal-mining work.

EACH TYPEWRITER HAS ITS OWN CHARACTERISTICS

Handwriting experts have been able to solve many mysteries, but the advent of the typewriter was supposed to present insurmountable difficulties to investigators because of the supposed lack of individuality in the writing machine. In a recent trial in New York, however, the question of authorship of a certain telegram became important, and the original copy from the files of the telegraph company was submitted to typewriter experts, together with the machine upon which it was supposed the copy was written. Without difficulty they found certain distinguishing features about the letters and marks on this machine, which were not present on others, and identified the original copy as having been written as alleged. Upon the presentation of this evidence in court, the man suspected admitted that the findings of the experts were true.

GOVERNMENT EXPERTS STUDY MILL-DUST EXPLOSIONS

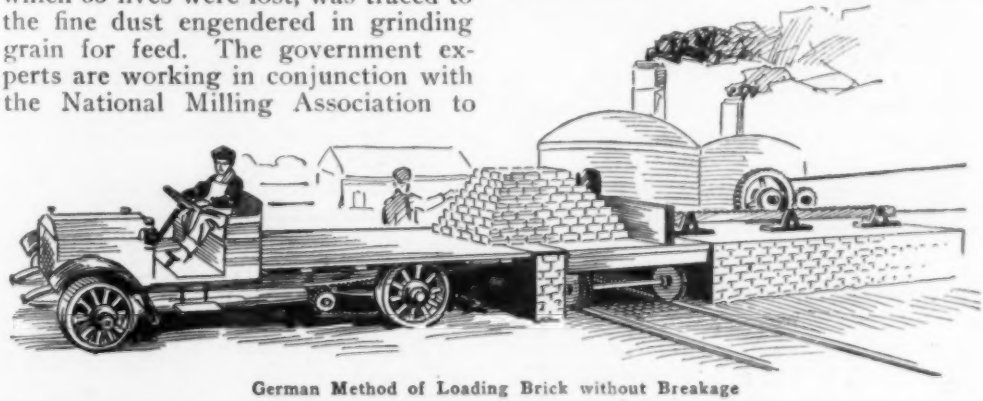
Engineers from the Bureau of Mines are investigating all dust explosions where two or more fatalities have resulted. These take in both mine and mill accidents. The explosion in a grain mill in Buffalo not long since, in which 33 lives were lost, was traced to the fine dust engendered in grinding grain for feed. The government experts are working in conjunction with the National Milling Association to further investigate conditions, and devise preventive measures relating to inflammable dust.

MAGNESIUM LAMP FOR PHOTOGRAPHERS

A contrivance is in use in Europe by photographers by which illumination for timed exposures is given by burning magnesium. A certain length of ribbon burns a predetermined time as shown on the dial of the apparatus. The magnesium ribbon is wound within the receptacle, upon the rim of which definite lengths are indicated to burn a certain time. The ribbon is pulled out as far as desired and then lighted, burning till the aperture is reached, when it goes out.

MOTOR-TRUCK LOADING DEVICE

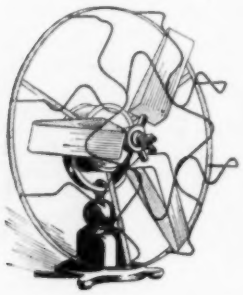
From Germany comes an ingenious method of loading brick from kiln to motor truck without handling individual brick, thus saving breakage. A low wall separates the truck from the track upon which the car from the kiln is run. A mechanically operated rammer at the same level as the top of the wall, which is also the level of the car platform and the floor of the truck, pushes the load of brick from the car across the wall, directly upon the truck.



German Method of Loading Brick without Breakage

FAN TO PRODUCE CHANGING BREEZES

Pleasant, changing breezes and gentle puffs of fresh air, instead of a hard, steady blow, are produced by an intermittent electric fan, just brought out in England. The fan not only varies the intensity of the air current continually, but reverses its blades at intervals to drive the air in the opposite direction. The intermittent breeze is produced by reversible blades, automatically rotated on their stems so that they are continually changing their angle.



FASTENER HOLDS TONGUE OF SHOE IN PLACE

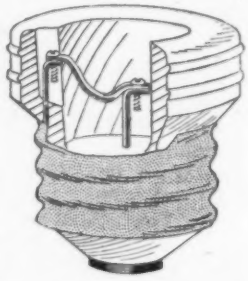
An invention by a Canadian is designed to prevent the tongue of a shoe from slipping down out of place. The contrivance consists of a ball-and-socket fastener, the ball portion being on the tongue and fitting into the socket, which in a man's shoe is part of the hook itself, while in a woman's shoe, where the eyelet is employed, a separate socket is inserted.

CURIOUS "SHEEP HUNT" SPORT IN RUSSIAN TURKESTAN

A horseman carrying a sheep and pursued by thousands of mounted men constitutes a popular sport in Russian Turkestan, where the "sheep hunt," as it is called, takes the place of football as a national sport. The owner of the swiftest mount has a sheep tied to his saddle, and then gallops away. He is chased by the other riders until one or another has captured the sheep. This game is carried on before thousands of the half-wild tribesmen, whose knowledge of the game, whose love of the horse and whose sporting proclivities are aroused to the highest pitch of excitement by the chase. It is usually a feature of the Mohammedan New Year festivities.

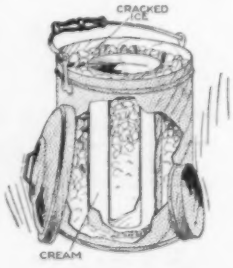
A FUSE PLUG THAT CAN BE REWIRED

Ventless electric fuse plugs that can be refilled and used repeatedly after the fuse has blown out may now be bought. In construction they are exactly like the usual fuse plugs except that the short piece of fusible wire, instead of being soldered to the connections, is held in place by binding screws just inside the mica cover. When the old-style fuse plug burns out it must be thrown away, but the patented refillable plug is ready for use again as soon as a new fuse wire has been inserted.



A CRANKLESS ICE-CREAM FREEZER

No weary cranking is necessary in making ice cream at home, if one has one of the new crankless freezers. It is simply packed with cracked ice and the rest of the operation is automatic. The can which holds the cream, or sherbet, to be frozen has an inside section to hold cracked ice, and all the cream in the narrow space between the two walls is thus brought in close



contact with the melting ice and quickly frozen. The frozen cream comes out of the can in cylindrical form with a hole down the center, so that it can be sliced up into "frozen doughnuts."

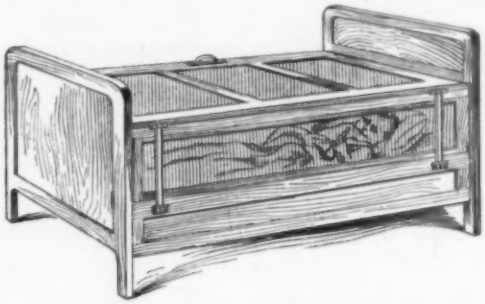
EUROPE FEELS THE NEED OF A WORLD LANGUAGE

In America we hear little of a world language and feel less the need of such than Europe where 20 nations back up into each others' yards, and not less than 27 languages are spoken, beside innumerable dialects and patois, the idioms of limited areas. The United States Consul at Berne, Switzerland, in a recent report, discusses the objects of the Association for the Creation of a Universal Language Bureau which has been founded for the avowed purpose of stimulating interest in an auxiliary language. It is not sought to drive out any existing language, but rather to introduce a tongue which may bring about an easier understanding among all nations, especially for use in commerce. No propaganda is urged for any of the various international systems already established, among which are systems bearing the names Bolak, Esperanto, Europal, Ido (reformed Esperanto), Latino sine flexione, Neutral (reformed neutral), Pankel, Perfect, Romanal, Tutonish, Viva and Volapük. The immediate aim of the association is to induce the government of Switzerland to summon an international diplomatic conference to discuss the advisability of officially recognizing some international language. Should such negotiations be successful it is planned to have a commission examine existing systems of artificial languages, select the most suitable and lay down the lines for future development.

¶Pajamas of cheap quality are a staple article of commerce in Afghanistan, and lamp ware, fountain pens, barbed-wire fencing and corrugated iron are also in demand.

BED INCLOSED BY FOLDING SCREEN PANELS

Folding screen panels to protect beds and cribs from flies and mosquitoes are the interesting part of a patent

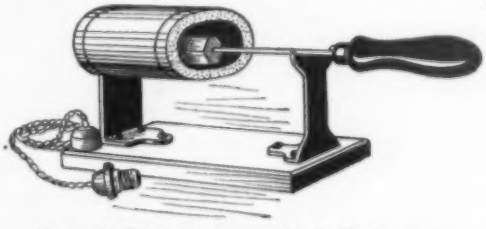


Folding-Screen Cover to Keep Flies off a Bed

recently taken out. The screen arrangement is designed especially for babies' cribs, but it can be built on a larger scale for any bed. It consists of two screened panels fastened permanently above the sideboards of the bed and another screen panel which serves as a cover. An ingenious hinged-lever arrangement is fastened to one side of the cover so that it can be folded down on one side, out of the way.

ELECTRICALLY HEATED SOLDERING IRON

A portable electric furnace for heating a soldering iron is one of the late applications of utilizing the electric current for mechanical heating, where gas, oil or gasoline have heretofore been employed. The fact that the appliance

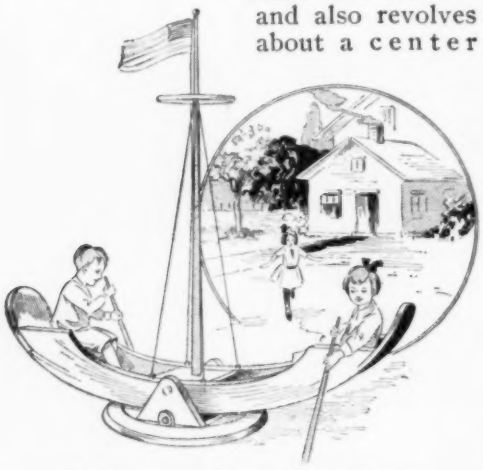


Portable Electric Furnace for Soldering Irons

may be plugged in on any 110-volt lighting circuit makes it convenient in repairing plumbing, soldering wires, and other household adjustments.

NOVEL SEESAW FOR THE CHILDREN

A novel accessory for the amusement of children while playing on the lawn is a seesaw in the form of an ancient boat that rocks and also revolves about a center post, which is securely fastened on a circular base. It is a merry-go-round as well as a seesaw and furnishes entertainment for little folk of all ages. At night it may be lighted with Chinese lanterns suspended from the crosstree of the mast, and bells may be hung about it to jingle, if so desired.



Revolving Boat That is Also a Seesaw

AIR-DRIVEN TUGS TO TOW CANAL BOATS

The air drive, after exhaustive tests on barges propelled by aerial screws on the Surrey Canal by an English syndicate, is to be used on steel tugs towing cane scows on the canals in British Guiana. Some 30 of these steel tugs, having a draft of but 10 to 12 in., will be built, each capable of towing about a dozen punts or scows, each weighing some six or seven tons loaded. From the data obtained in the trials it is believed that in actual practice a load of 50 or 60 tons could easily be towed at four miles an hour by means of the specially designed air screws, which consume 16 hp., without in any way straining the motor used. Four miles an hour, it is pointed out, could readily be maintained on a busy canal, for the air-drive tugs and their loads could not only easily overtake other barges moving in the same direction, which must hug the towpath, but could at any moment use the whole width of the canal for turning, if necessary. No difficulty is feared from the possible interference of these air-driven tugs with each other in passing, nor in damaging other craft. The propellers used in the trials were less than half as long as the barge was wide, and the danger and impediment arising from the propeller was only trivial.

NEW LIQUID-SOAP CONTAINER

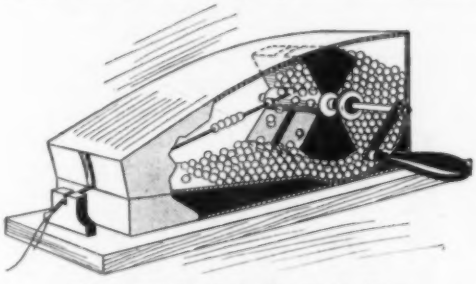
A new liquid-soap container, coming into use in the wash rooms of passenger coaches, is a great improvement over the type of container which consists of a glass bottle that exudes the soap when rocked. In the new arrangement, the soap container, a jar holding a quart of the liquid, screws up under the wash stand. A nickel fixture, not unlike an ordinary water faucet in appearance, rises from the top of the stand and protrudes over the washbowl. The user places the palm of one hand under the soap faucet and presses together, between the thumb and forefinger of his other hand, the two little tabs or projections shown in the illustration. This action

Device That Pumps Liquid Soap

pumps a certain quantity of soap into the palm of the hand. All but the faucet is out of sight under the washstand.

MACHINE STRINGS BEADS QUICKLY

An ingenious little machine is used in Germany for stringing beads, such as are a part of many embroideries. A hand-revolved axle bears two metallic wings, set something like the blades of a propeller, but with a narrow space between. Inserted in this space a long needle lies on the axle, the point projecting a trifle above the surface. As the machine is turned the beads placed within the receptacle are constantly agitated, and at each revolution one or more beads, striking against the point



Machine Makes Stringing Beads Easy

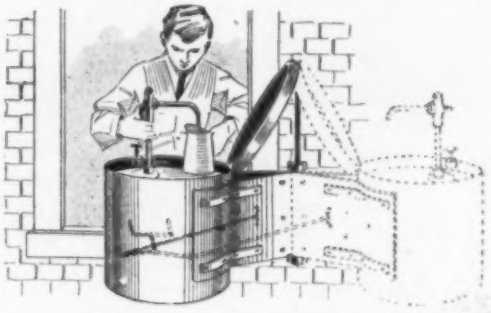
of the needle at the proper angle, are impaled, and so continue on down along a thread placed to receive them.

ANCIENT PRINTING BLOCKS IN KOREA

Thousands of printing blocks have recently been discovered in an old barn back of the Buddhist monastery Hainszu, in Hyopdshong, Korea. These blocks are believed to be more than 800 years old, and refer to old Buddhist religious precepts. The barn was built, according to the Buddhist monks of the monastery, 1,100 years ago, and is surrounded by great maple trees which have attracted tourists by their beauty. So far as known, these printing blocks are the oldest in existence and are of enormous artistic and historical value.

OUTDOOR GASOLINE-CAN SAFETY DEVICE

The peril of fire, always present when gasoline is kept in quantities within factories or shops, may be in

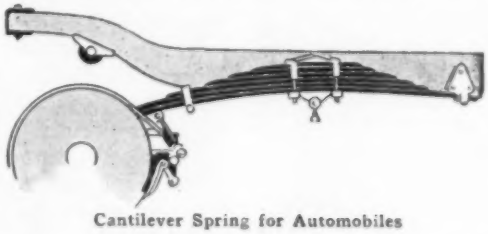


Gasoline Can within Easy Reach of Shop Window

large measure avoided by the use of an outdoor attachment recently patented. The can, which is of the ordinary pump type, swings on a hinged support fastened outside the window. A lever arrangement worked from the inside brings the can around in easy reach when wanted, or swings it back again out of the way. The can is fitted with a hinged cover, excluding rain, snow or dust.

CANTILEVER SPRING GIVES FLEXIBILITY

An automobile spring pivoted to the frame at the center and shackled at the front end is clipped to the axle at the rear end. This gives true cantilever support and affords a high de-

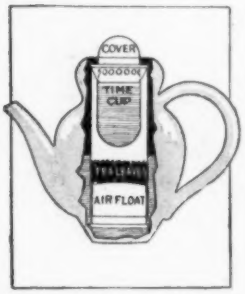


Cantilever Spring for Automobiles

gree of flexibility, when the spring itself is an inverted semielliptic one. This form of support lends itself to the use of a shock absorber also if desired.

NOVEL AND PRACTICAL THINGS FOR DAILY USE

An aluminum tea bob for use with an earthen teapot has an air chamber at the bottom. Tea leaves are placed on this and boiling water poured in, which drips through small holes upon the tea, and then runs out into the bottom of the teapot. When the water has all run out, the bob, relieved of the weight, rises, carrying the tea leaves with it.



Tea Bob Makes a Perfect Beverage

Radiators may be converted into convenient stands for various purposes by means of a wooden shelf of suitable size, supported upon metal brackets which are fixed to the radiator firmly. Dishes, silver, or table china may be placed on the shelf; or telephone, filing cabinets and books; flowers and growing plants; or the shelf may be used as a substitute for a mantelpiece.

Radiator Table Easily Made and Convenient

Washing the baby is something of a task in the ordinary household, requiring considerable preparation and resulting usually in a mussy floor. A small enameled bathtub has been devised which is arranged to be placed on the big tub in the bathroom. A broad support also rests on the tub, so the baby may be easily dried and dressed.

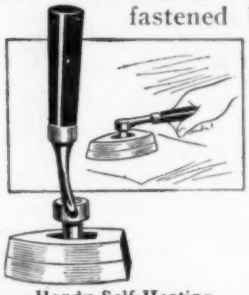
Bath Kit for the Baby Relieves Mother

The kitchen table is often too high or too low for comfortable use. An adjustable table, which may be easily raised or lowered, makes it equally convenient for rolling out pastry or for ironing. Steel rods concealed in the wood give it rigidity.

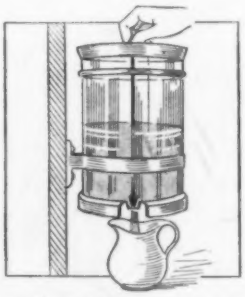
Adjustable Kitchen Table Saves Backache

A practical self-heating flatiron, convenient for travelers, has been brought out, the top of which is in two parts. By turning the iron over, the upper section, which is hollow, may be revolved and filled with alcohol, by which the iron can be heated quickly.

A patented household cream separator consists of a 2-qt. glass container fastened by a ring within the refrigerator. A rod extends through a detachable cover to the bottom, where it plugs a small hole in the glass. Milk poured into the container is separated through gravity. Upon slightly lifting the rod, skim milk flows out of the bottom into a pitcher or pan, while cream may be obtained from the top of the container, or drawn out after the skim milk.


Handy Self-Heating Flatiron for Travelers

A framework of springy steel rods affords yielding support for the baby basket and is light and easily put out of the way. The frame


Gravity Cream Separator for Family Use

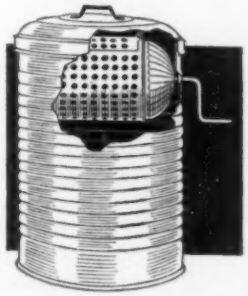
is broad enough to give stability, and no swinging of the basket can overturn it. Casters at the corners make it readily movable, while a slight rocking of the basket will, by reason of the springiness of the support, continue the rocking motion for a long time.

Springy Frame Rocks Bassinet Safely

Measuring a teaspoonful is easy enough, but to get exactly half a teaspoonful was almost impossible before the invention of the half-spoon illustrated here. Upon an ordinary handle, the half of a teaspoon bowl is fixed, a wall of silver cutting the usual bowl in two lengthwise. Its use in the kitchen, in the sick room, or where accurate measuring is desired, safeguards against error.

Kitchen Device for Measuring Half Teaspoonfuls

Much coal can be recovered from the ashes drawn from furnace or heater if a sifter is used. Too often the device used leaks dust and makes the task a most unpleasant one. Recently a dustless revolving sifter has been put on the market with a seamless cover fitting over the outside, keeping all the fine dust in, yet affording easy access to the sifter for putting in the unsifted ashes and taking out the coal.

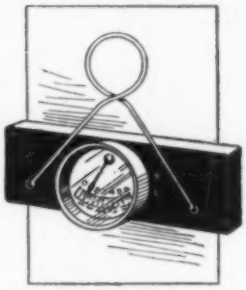


Rotary Ash Sifter Rendered Dustless by Cover

When pins are used in any quantity the desire to "have them handy" results most often in a dust-catching receptacle from which by dint of pricked fingers one may sometimes obtain a pin. A novel pin fountain is manufactured with a glass dome for a top, which holds a quantity of pins, but by an ingenious device the dome, upon being revolved, drops a few pins into a convenient tray, from which they may be picked up readily.

Durable Pin Tray Keeps Out Dust

The increasing use of the fireless cooker has created a demand for some method of determining the heat of the stones placed within the compartment. A novel heat gauge makes it possible to know exactly how hot the soapstone slab is to be used. A brass plate with steel racks operating a pinion carrying the indicator is the basis of the device. It registers the heat quickly, and when not in use may be hung conveniently near the cooker.



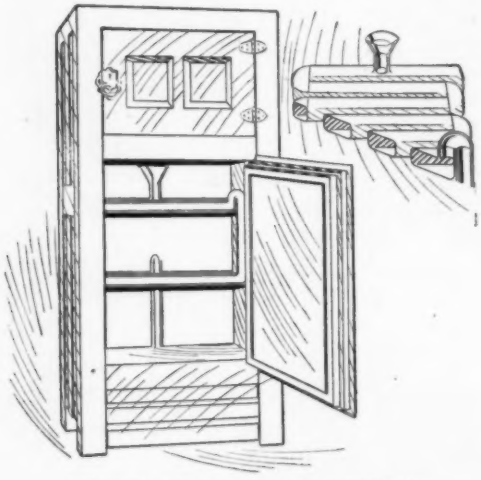
Handy Heat Gauge for Soapstone Disks

There are few more exasperating things than to lock something securely and then be unable to find the key when required. This unpleasant condition may be avoided by using a keyless padlock. Eight projecting knobs actuate tumblers within the padlock. By pressing certain knobs, forming the combination, the lock opens instantly.

This Lock Requires No Key

COLD-RADIATOR SYSTEM IN REFRIGERATORS

A device made of rectangular tubes in the form of shelves adapted to the interior of a refrigerator has been in-



Automatic Ice Saver for the Household

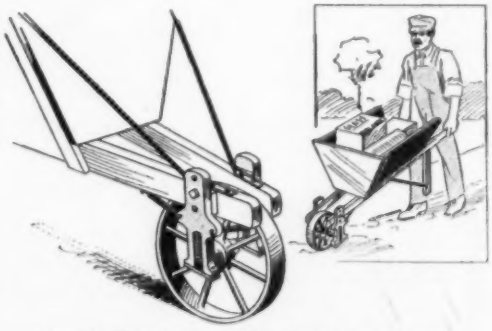
vented. These tube shelves catch and circulate the water dropping from the melting ice, always remaining full of water, and, by gravity, circulating the water to the overflow. The increased cold surface and heat absorption afforded by two gallons or more of ice-cold water is stated to add materially to the value of the refrigerator, cooling the food much more quickly, and maintaining a reduced temperature in the food compartment. The device may be installed in any refrigerator, old or new.

RATS IN COPPER MINES ARE SCAVENGERS

In the copper-mining district of Michigan rats are highly regarded for the valuable aid to underground sanitation they give. Rats are the scavengers of the mines. They keep the levels clear of refuse. They are protected and made pets of by the men who often share their dinner pails with the rodents. So accustomed to the presence of human beings are these rats that they frisk about the miners without a shadow of fear. Underground they indulge in no depredations, existing as they do within the rock-bound walls, inclosing nothing possible for them to destroy. That they are largely dependent upon the food furnished by the scraps and leavings from the miners' meals is evident from the fact that the prolonged strikes which occurred in the copper district resulted in thinning out the number of rodents very largely. Not only was their food supply cut off, but many were drowned when the pumps draining some of the levels were put out of commission, and the workings filled with water.

SHOCK ABSORBER FOR THE WHEELBARROW

A gold medal was recently given in France for a shock-absorbing attachment for the common or garden variety of wheelbarrow. The shock absorber consists of two uprights, one on each side of the wheel, at the bottom of which the axle is inserted so as to bear against vertically supported springs. The device is intended not only to save any fragile load carried on the wheelbarrow, should an obstruction be struck



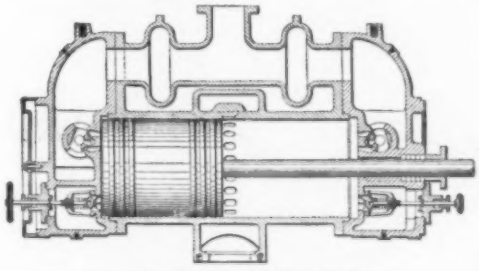
Humble Wheelbarrow Now Has Shock Absorber

on the road, but also to lessen the jar on the hands of the laborer when handling heavy loads on uneven ground.

¶Alaskan reindeer meat is becoming a popular food in Pacific coast cities.

A NEW TYPE OF STEAM ENGINE

In the attempt to produce a steam engine that would be more economical of steam, a German professor has developed a new type, called the "uniflow" engine. The difficulty which he has overcome is the initial cylinder condensation of steam because of the location of the exhaust valves in the ends near the intake valves. In the ordinary engine, the piston in driving out the exhaust steam reduces the temperature of the cylinder head to that of the exhaust steam, and the incoming live steam meets cold walls and is partly condensed. In the new engine, the exhaust ports are placed in the middle of the cylinder, where they

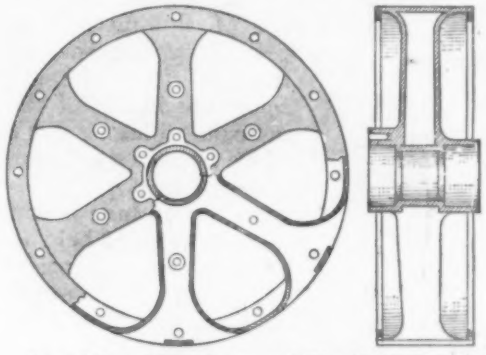


Cross Section of the New Uniflow Steam-Engine Cylinder

are uncovered by the piston at the end of the stroke, and the intake valves are at the ends. Thus there is always a flow of steam from the ends of the cylinder toward the center and the cylinder heads are kept at a more uniform temperature. A single-cylinder uniflow engine which is in use in Germany produces 6,600 horsepower.

NEW STEEL WHEEL FOR MOTOR TRUCKS

The making of a cast-steel truck wheel that will have both the strength and resiliency required for the severe service to which such vehicles are subjected is a difficult matter owing to the unavoidable weakness of castings of all kinds at the junction of the rim and spokes. This weakness is apparently overcome in a new type of wheel recently placed on the market. The rim of this wheel is of a channel section, while the spokes are hollow and



Curved Junction of Spoke and Rim Makes Steel Truck Wheel Strongest at What is Usually the Weakest Point

have sides curved in such a way as to join the rim without a sudden change in direction. This wheel is somewhat lighter than a wood wheel of the same carrying capacity.

PAN AND RACK FOR DRYING DISHES

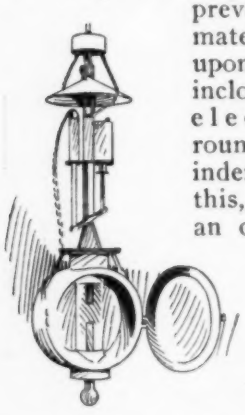
A new device for drying dishes consists simply of a pan, 20 in. square, fitted with a removable wire rack to hold the dishes on edge while draining, and to keep them out of the dripping rinse water. After the dishes are washed they are set on edge in the rack, scalding water is poured over them and they are allowed to dry, the

Dish Drier That Consists of Pan with Wire Rack for Holding Dishes on Edge

idea being to eliminate the use of the towel for drying. By this method the dishes are both cleaned and sterilized.

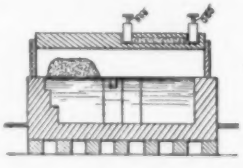
AN ARC LAMP WITH A CHIMNEY

High efficiency is claimed for this arc lamp because of the method of preventing a deposit of material from the arc upon the inside of the inclosing glass. The electrodes are surrounded by a glass cylinder or chimney, and this, in turn, is held in an outer part consisting of a metal ring piece with concave glasses on each side, one of which is hinged. The ring piece is so made as to form a hollow or annular chamber. The air circulates between the chimney and annular chamber, depositing all suspended matter upon the cold metal walls of the chamber. The latter is protected on the inside by a nonoxidizing coating.



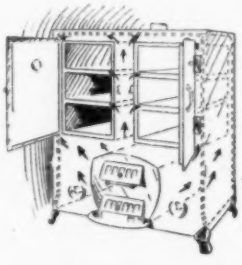
NEW ELECTRIC FURNACE FOR MAKING GLASS

An electric furnace for the manufacture of glass, patented recently by a French inventor, makes possible a continuous process of manufacture, combining all the operations of melting and refining within a single furnace supplied by one source of heat. The furnace consists of two chambers separated by a dam which floats on the molten glass. The electrodes for melting the glass are in one chamber and close enough together so that only a low-tension current is needed. As the raw materials are fed into this chamber, they float on top of the molten glass until they are melted down and refined. At the same time, refined glass at the bottom passes under the floating dam into the other chamber. As the temperature of the whole furnace is not extremely high, blowpipes can be inserted directly into the second chamber to take out the molten glass ready for working into commercial shapes.



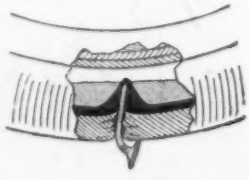
BAKING OVEN OF NOVEL CONSTRUCTION

A baking oven that embodies a number of novel features is shown in the accompanying illustration. From the fire box, which is placed at the base of the oven, the heat passes up through a central flue placed between two tiers of compartments, then over the tops of the compartments and down the sides of the oven to the fire box. The passages between the compartments are so proportioned that each receives the same amount of heat, and receives it uniformly from the sides, top and bottom. The smoke and gases from the fire box do not circulate through the flues, but are carried into the chimney through a pipe located in the center flue. For ease of access in cleaning, all compartments and partitions are removable.



MAKING AUTOMOBILE TIRES PUNCTURELESS

A new way of attacking the pneumatic-tire problem is to make inner tubes punctureless by increasing their elasticity. Rubber tires, after they have been molded, are covered with sulphur or pumice stone to harden them for handling. This treatment also makes them less elastic and more easily punctured.



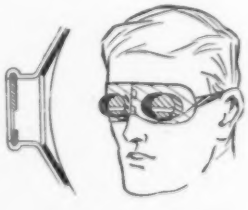
To restore their elasticity, an Iowa man has patented a mixture to be poured into the tire for dissolving the sulphur and softening the rubber. It makes the inner surface of the tube so elastic that when a nail is driven into the tire the rubber stretches and expands about the end of the nail without breaking.

FETERITA IS A NEW GRAIN OF THE SORGHUM GROUP

A new grain and silo crop is assured by the introduction of "feterita" by the U. S. Department of Agriculture, whose experts are constantly searching the byways of the world for crops which can be adapted to conditions within the United States. Feterita is an early ripening sorghum, valuable for grain and forage, rising on slender stems 5 to 7 ft. high which are fairly juicy and slightly sweet before ripening, much relished by stock. The grain ranks with the kaffir corns and milo as a fattener, but the addition of a small amount of cottonseed meal is recommended to increase its efficiency as a flesh grower. For use in silos, feterita is claimed to be equal to any of the sorghums. It was first introduced from Alexandria, Egypt, into the United States, but later obtained in quantity from the Sudan, and is adapted to arid regions.

NEW AUTOMOBILE GOGGLES RELIEVE EYESTRAIN

A recent invention is goggles for use by motorists in which the glasses have portions of different thickness and color, whereby one portion is clear and the other more or less clouded. The field of vision is limited to the clear-glass portion while the glare and flicker is measurably removed by the colored glass in the remaining portions.



NEW SYSTEM CALLS EXPRESS WAGON PROMPTLY

Each tenant in a new office building in New York is provided with a number of small metal disks or checks,

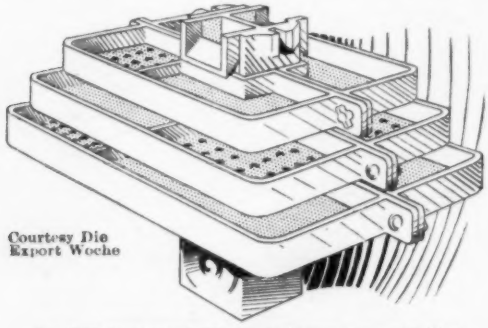
Units Used in Novel Call System for Expressmen

bearing on the one side his room number, and on the reverse, the name of an express company. When he desires to have an expressman call at his office for a package, he deposits a check in a special chute in the elevator wall, and the check drops down to the first floor, where an authorized employe of the building opens the box, records the room number and notifies the proper expressman he is to call at that room. The expressman takes with him the check as evidence of his authority to receive the package.

¶The sledges for Sir Ernest Shackleton's trip to the South Pole, built of a light but strong composition metal, weigh 60 lb. less than wooden sledges and are therefore able to carry that additional weight of food.

GERMAN FEED-WATER SOFTENER

A new feed-water softener for steam boilers, recently brought out in Germany, is said to be particularly effi-



An Efficient Feed-Water Softener Brought Out in Germany

cient. The apparatus consists of several superimposed shelves, divided into compartments, some of which have perforated bottoms. The water, preheated to a temperature of about 300 deg. F., zigzags through these perforated bottoms. All the gases in the water are driven off by the high temperature and the scale is quickly and completely separated, forming as a loose deposit which can be blown out easily.

A COMBINATION DOG FOR LATHES

This combination dog for turning shaftings holds securely all kinds of crankshafts, eccentrics, and straight work of every description, and can be used wherever the common lathe dog has formerly been employed. The tool may be adjusted from a 2-in. up to a 6-in. swing.

¶Rock said to be suitable for lithograph work has been found on the Angat River, in the Philippines. The only quarry where lithograph rock is obtained in any quantity is in Bavaria.

HOW THE MARTIANS MADE THEIR CANALS

That the canals on the planet Mars were constructed, not by excavation but by building walls or dikes, is the latest theory put forth by astronomers to account for the enormous size of these waterways. These canals, first discovered by the Italian astronomer Schiaparelli, have given rise to much speculation on the question whether the planet is inhabited. Astronomers now quite generally accept the theory that the canals are the product of intelligent action, artificial aids to agriculture, irrigation projects on a scale impossible on the earth's surface. Instead of being dug, as was once believed, it is now considered by some observers that they are built, or made between two walls on the surface, as they have to be higher than the vast fields they are intended to irrigate. It is obvious that it would cost no more to build up the walls of a canal 20 or 40 miles wide than it would for one only one mile wide, while the volume of water carried and consequently the area of land watered would be far larger. According to this theory, the mountains of Mars have been taken down, the rivers dammed or canalized, and the sea, into which no more fresh water is permitted to run, is evaporating itself, adding to the volume of fresh water. Thus Mars has been transformed into a gigantic garden where the most economic and intensive cultivation is the order.

DEVELOPMENT IN ALUMINUM REMARKABLE

The rapid increase in the production of aluminum has not kept pace with its extension into different fields of art and manufactures. The fact that copper is cheaper than aluminum and that it is a far better conductor has not served to keep aluminum out of the electrical field, for by combining it with steel strands, huge cables carry high-voltage currents over long distances as satisfactorily as copper would.

Cooking utensils of aluminum, although not superseding enamel ware, are rapidly growing in favor, while the automobile industry is demanding more and more of this metal which, being light and easily workable, is ideal for use in bodies. The powdered metal is used in painting, lithographing and printing, and as a constituent of explosives. The manufacture of aluminum tubing is gaining rapidly. An increase in consumption of aluminum from 46,000,000 lb. in one year to 65,000,000 lb., almost 33 per cent, all the while increasing in price, is evidence that the new plants in course of construction both here and abroad have their work cut out for them.

FOOT ATTACHMENT FOR AUTOMOBILE JACKS

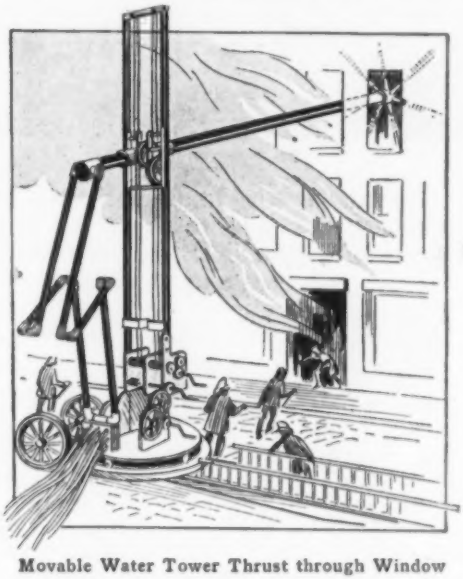
"Jacking up" an automobile is an easy matter, so far as mere muscular exertion is concerned, when a modern jack is used. But the operation is often marred by the dust and grease which are almost inseparable adjuncts. A device which enables the motorist to avoid these consequences, by operating any auto jack with his foot, is the product of a Chicago manufac-

Keeps Grease and Dirt Off the Automobilist's Clothes

turer, whose foot-stirrup attachment may be quickly adjusted and is easily operated in a standing position.

NOVEL MOVABLE WATER TOWER

Differing from the usual form of water tower, which throws only one stream of water upon the roof or inte-



Movable Water Tower Thrust through Window

rior of a burning building, a new type has been invented designed to throw a number of streams of water in various directions against the flames. The discharge pipe of the new tower is constructed so that it may be projected into a window or other opening, the end being equipped with a number of nozzles presented in different directions. The pipe may be raised or lowered, or tilted at any angle.

TELEPHONE LINE STRUNG ON KITES

During a recent storm in California, a large amount of telephone line was destroyed, and communication between many points cut off. The repair crew was halted at the Salinas River, where the entire line of supports was washed away. Immediate establishment of communication being necessary, and the high water and lack of materials prohibiting the construction of a temporary line in the usual fashion, several large kites were built and flown. On

these a wire was strung and carried across the river. The entire telephone business of the section was carried on over this one wire until a permanent cable could be installed. So successful was the experiment that the repair department of the telephone company now includes kites as a part of its regular equipment.

RUBBER SLEEVE HOLDS CORK IN BOTTLE

The disheartening experience in traveling, of finding the cork out of a bottle in grip or trunk, is not an uncommon one. A little device of pure rubber which slips over the top of a bottle, holding the cork securely in place, has been invented to obviate the trouble. It consists of a sleeve which slips tightly over the neck of the bottle, and has a band portion engaging the cork, preventing its removal until the band is pushed off.

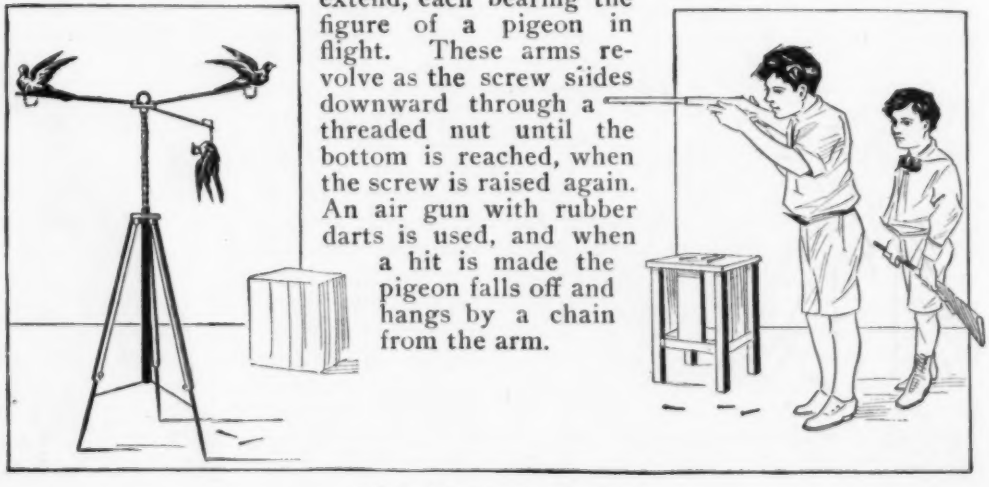
MEXICAN INDIANS MAKE TINY DOLLS

Dolls not more than a quarter of an inch in length are made by the Mexican Indians. First a framework of wire is wound with silk thread until the figure is of proper shape. The costumes, cut to represent some character, are then fitted and sewed on. With the smallest-size needles and almost invisible thread, various designs are embroidered on the dolls' clothing in silk, and so clever are these dusky workers that even when viewed under a powerful glass the details appear perfect.

The hair is put on after the doll is properly dressed, the braids are tied with ribbons of appropriate hue, and then the eyes, nose, mouth, and the hands and feet are formed. Some dolls are equipped with tiny baskets of flowers, fancy sombreros, or water jars. The baskets are woven of hair. the pottery is of clay in exact imitation of the practical articles, and the flowers are of silk worked with genuine artistry.

AIR GUN AND TARGET NEW FRENCH TOY

A revolving target upon which toy pigeons are perched, is a sporting device recently brought out by a French inventor. A tripod with extension legs is provided with a sliding vertical screw, at the top of which three arms extend, each bearing the figure of a pigeon in flight. These arms revolve as the screw slides downward through a threaded nut until the bottom is reached, when the screw is raised again. An air gun with rubber darts is used, and when a hit is made the pigeon falls off and hangs by a chain from the arm.



Pigeon-Shooting Toy for Boys

MOTOR-VEHICLE CENSUS RECENTLY TAKEN

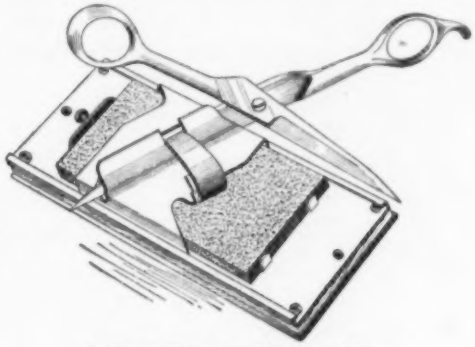
An English automobile magazine recently compiled a census of motor-driven vehicles in the United Kingdom which may be considered authoritative. From data in the hands of license officials in the various cities and towns of Great Britain, it was learned that the total number of motor vehicles of all types in the United Kingdom is 425,838, of which motor cars comprise 227,907; motorcycles, 179,926, and heavy vehicles, 18,005. The same authority gives the number of motor vehicles in France as 90,959; Italy, 20,470; Germany, 77,116; Austria, 14,300; Belgium, 13,250; Switzerland, 10,370; Canada 34,793, and the United States, estimated, 1,435,000.

OIL MIXER ATTACHED TO EGG BEATER

Oil can be stirred into mayonnaise dressing very quickly by the use of an improved egg beater now on the market. The new mixer is simply a whirling egg beater with a detachable oil funnel hung on one side of the handle. A screw valve in the funnel makes it possible to add the oil a drop at a time, early in the beating, and increase its flow to a steady stream as the mixing progresses.

AUTOMATIC HONE SHARPENS SCISSORS

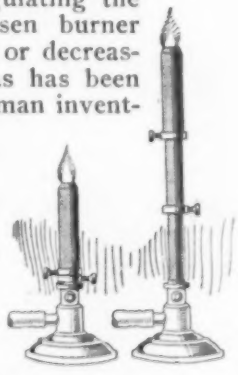
A hone with an automatic guide that holds the blade of a pair of shears in the right position by means of a clamping and pressure spring, has been placed on the market and appears to be simple in operation and sure in results. The base, upon which the carriage slides, is of steel, and so arranged that the carriage can move only so far. A clamped guide holds the blade of the shear at the right angle upon the surface of the hone. Once fixed in position, the shear is moved back and forth until properly sharpened, as the springs give the requisite pressure and hold the blade rigidly while honing.



A Shear Hone for Household Use

TELESCOPING ATTACHMENT FOR BUNSEN BURNER

A device for regulating the heat from a Bunsen burner without increasing or decreasing the flow of gas has been perfected by a German inventor. This device consists of a telescoping upright by which the work may be done at the proper distance from the flame for securing the degree of heat desired. The principal advantage claimed is the elimination of the back-firing that often occurs when the flow of gas is reduced.



¶Water that flows from an artesian well at a temperature of 100° F. is used for heating purposes in a South Dakota town.

PROOF MARKS ON EUROPEAN GUN BARRELS

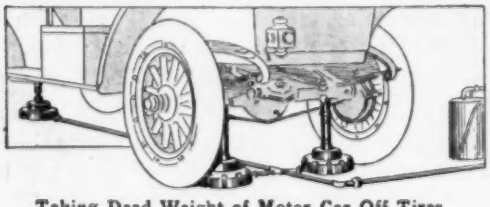
Following an ancient custom dating back almost to the invention of firearms, all European gun makers stamp

Proof Marks Used by European Gun Makers to Indicate the Quality of Their Guns

their gun barrels with graded proof marks indicating the quality of material and workmanship. Before and after each gun is finished, its barrel is subjected to firing tests and to several examinations for defects. All guns that pass the proving tests are graded according to quality, and their barrels are stamped with the maker's proof marks. As every gun maker has five or more proof grades, it is possible to tell from the proof mark on a foreign gun how good a gun it is.

JACK FOR RELIEVING AUTOMOBILE TIRES

The automobile relief jack provides means for relieving the tires of motor fire trucks, and other apparatus, from the constant dead weight resting on a small surface of the tire while the apparatus is in the fire station. The device consists of a heavy diaphragm made of ducking treated with rubber, placed between two concave plates, one fixed in position and the other acting as a piston. The jack is operated by forcing water or other liquid through piping into the diaphragm, which is then locked in position.



Taking Dead Weight of Motor Car Off Tires by Means of Relief Jack

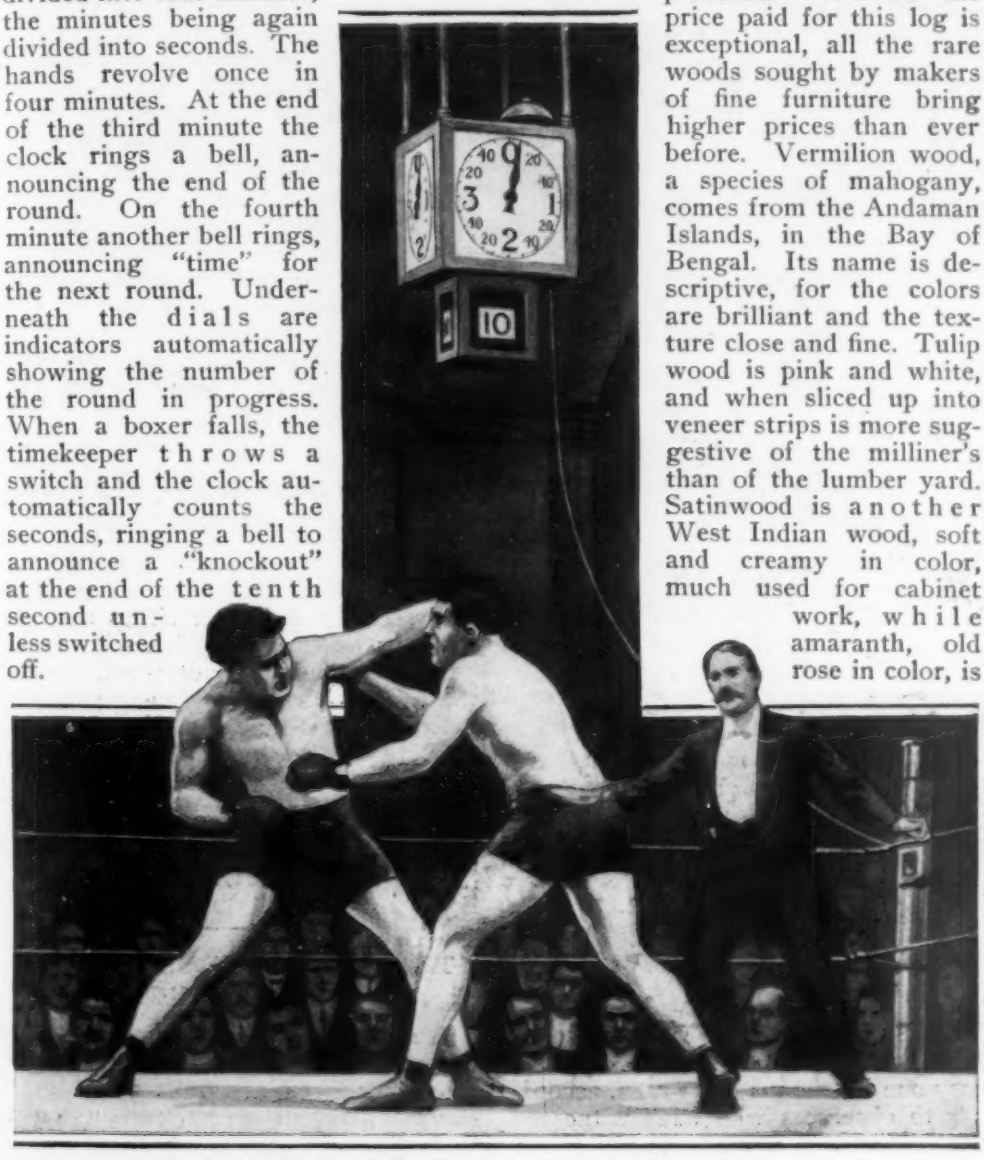
COLOR SCHEME FOR FAIR AT SAN FRANCISCO

In no exposition has the color scheme been more carefully studied than the great Panama-Pacific Exposition to be held in San Francisco in 1915. After prolonged study of local conditions, in which every shadow upon the Marin Hills across the bay were taken into consideration, the yellowish-white tint known as "old ivory" was chosen as the basic color for the buildings. Buff, deepening into rich brown, will be used to accentuate architectural features and secure the antique effect considered desirable. Then eight colors have been added for other decorations. These are French green, used in lattices, flower tubs and small doors; deep cerulean blue, for recessed panels and vaulted ceilings; pinkish red, for flag poles; reddish brown, for colonnades and for interior courts; golden burnt orange, for capitals of columns, smaller domes and architectural moldings; terra cotta, for other domes and roofing material, combined often with copper-green; gold, for groups of statuary surmounting the great courts and the dominant towers which are to be covered with gold and verd antique; a mottled green with pale yellow and black streaks, for the fountains, urns and vases.

¶Moving-picture exhibitions on trains is an innovation proposed by a French concern to the officials of the Trans-Siberian Railway. It is believed that such installation would be appreciated by everyone who is obliged to undergo the tedium of that long journey.

AN AUTOMATIC TIMEKEEPER ELECTRICALLY OPERATED

Directly above the center of the ring in the Sydney stadium, where Australian sports are housed, an automatic timekeeper for boxing matches is bolted to the girders, in plain view from every seat in the edifice. It is a four-dial clock, operated by electricity. The dials are 30 in. in diameter and are divided into four minutes, the minutes being again divided into seconds. The hands revolve once in four minutes. At the end of the third minute the clock rings a bell, announcing the end of the round. On the fourth minute another bell rings, announcing "time" for the next round. Underneath the dials are indicators automatically showing the number of the round in progress. When a boxer falls, the timekeeper throws a switch and the clock automatically counts the seconds, ringing a bell to announce a "knockout" at the end of the tenth second unless switched off.



A Clock Which Keeps Track of the Seconds in Boxing Contests

SINGLE LOG OF MAHOGANY SELLS FOR $8,000

A mahogany log, 4 ft. square and 24 ft. long, was recently sold in London to a New York firm for $8,000. This particular log came from Africa, where the mahogany forests have not been exhausted, as have those in Santo Domingo, from which some of the finest mahogany of the past was procured. While the price paid for this log is exceptional, all the rare woods sought by makers of fine furniture bring higher prices than ever before. Vermilion wood, a species of mahogany, comes from the Andaman Islands, in the Bay of Bengal. Its name is descriptive, for the colors are brilliant and the texture close and fine. Tulip wood is pink and white, and when sliced up into veneer strips is more suggestive of the milliner's than of the lumber yard. Satinwood is another West Indian wood, soft and creamy in color, much used for cabinet work, while amaranth, old rose in color, is

considered one of the most beautiful woods in the whole list. Teakwood, which is a yellowish-greenish white in its natural state, turns dark after years of exposure, and is usually stained dark brown before being made up. Teak is largely used in battleship construction, the floors and doors being almost wholly made of this wood, which does not splinter on impact.

DRIVING OUT THE EVIL SPIRITS

Treatment of the sick among the Eskimos is a matter of driving out evil spirits, and the job is not always an

Eskimo Medicine Man Driving the Evil Spirits from a Sick Boy

easy one for the medicine man, according to observers who have witnessed the process. In exorcising the evil spirits the grotesque costume shown is considered an absolute necessity, while to make the cure effective the medicine man must stand in one position for days at a time or until the patient has recovered.

BIG FLYING BOAT WEIGHS FIVE TONS

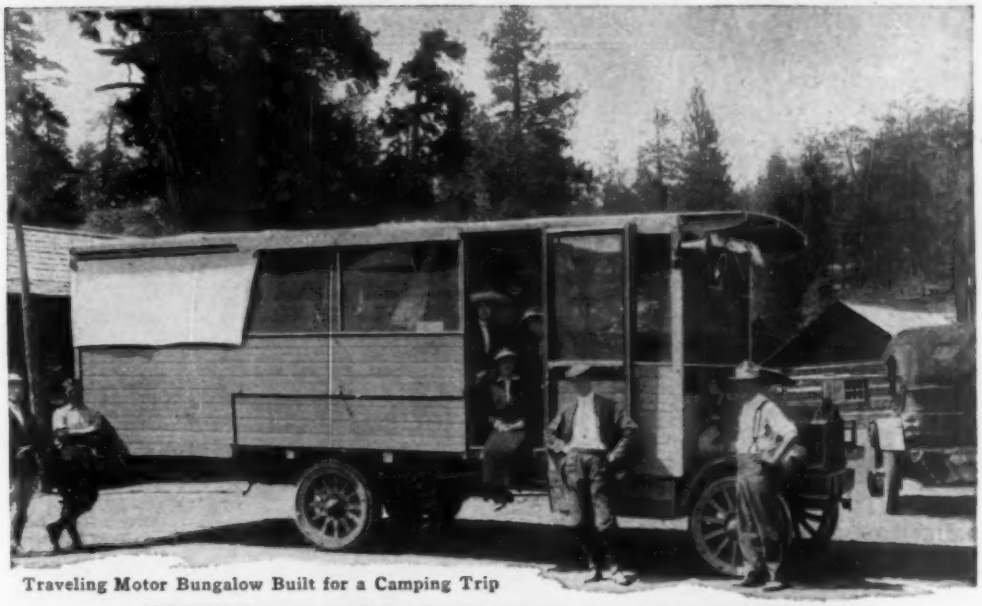
Recently the first trial trip was made upon the Seine, near Paris, of a flying boat, 29 ft. long and 9 ft. wide. Two planes, each 89 ft. in length, give a lifting power sufficient to raise the boat with two pilots, two mechanics and enough gasoline, oil and machinery to make its total weight five tons. Two motors, of 200 hp. each, operate a screw 16½ ft. long, and while no effort was made to establish a record for speed, enough was seen to warrant the belief that the craft would be able to negotiate long distances and at fair speed. The engineer is reported to have expressed his intention to build a larger machine next year, and attempt a transatlantic flight.

KILLING GROUND SQUIRRELS WITH A MOTORCYCLE

A farmer in a western state whose fields had been overrun with ground squirrels, discovered a cheap and effective way of ridding himself of the pests by taking his motorcycle out to the infested fields, and connecting the exhaust of his machine with the burrows by a piece of rubber hose. He then starts his engine and fills the holes with deadly gas. By using a cheap distillate, he finds the method a great saving over older processes, and it is very efficient.

TRAVELING BUNGALOW ON MOTOR TRUCK

A motor bungalow, mounted on the chassis of a 2-ton truck, was the uncommon conveyance built recently to carry a party of several persons on a three weeks' trip from San Diego, Cal., to Big Bear Valley. Although it con-

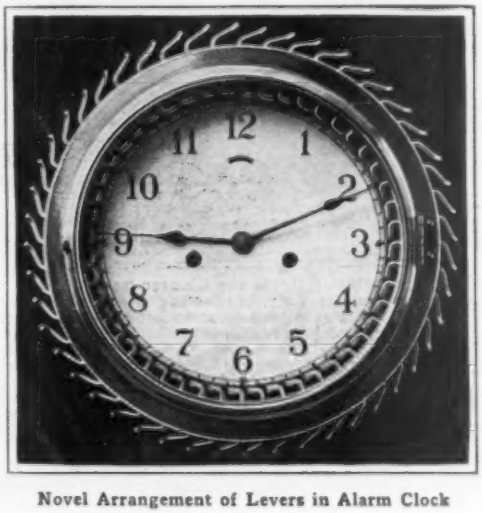


Traveling Motor Bungalow Built for a Camping Trip

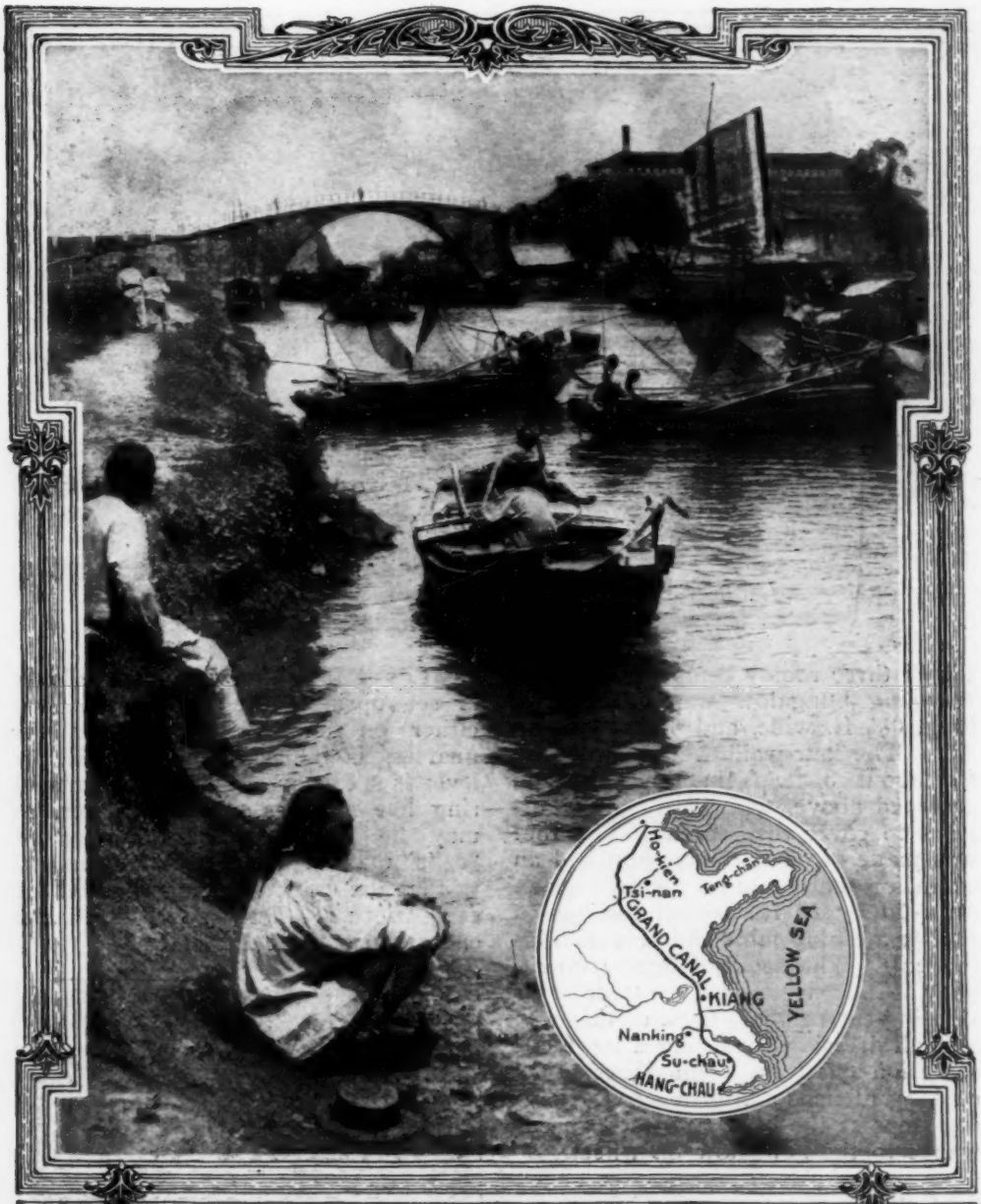
tained three roomy compartments, the traveling bungalow was only 26 ft. long, 6½ ft. wide, and 6 ft. high, inside. The four walls were boarded up for about 3 ft. from the floor and screened above, with canvas roll curtains to cover the screens. The roof was made of oiled canvas and had an extension that could be spread over an area, 10 by 22 ft., behind the car to shelter a dining table and several folding cots. The forward compartment, back of the driver's seat, contained four sleeping-car berths. Back of this was a small dressing room and a large observation platform with lockers for cooking utensils and provisions. Folding steps at the back furnished an entrance to the bungalow on wheels.

HOTEL ALARM CLOCK OF NOVEL CONSTRUCTION

Around the dial of a new "reminder" clock, intended for use in hotel offices, 48 levers are arranged, which permit of setting the alarm to ring at any desired time by an electrical connection. Each lever may be set in three different positions, either upright or at 45° either way. If the lever is set upright, the alarm will ring either on the hour, the half or the quarter, as the case may be. If the lever is set at an angle, the alarm will ring five minutes earlier or later, as may be desired. Any number of "calls" may be set up with the certainty that the clock will ring the bell for each in turn. Dry cells furnish the energy to operate the alarm.



Novel Arrangement of Levers in Alarm Clock



"YUN-HO" is the Chinese name for the Grand Canal, an artificial waterway nearly 1,200 miles long, connecting Hang-Chau with Ho-Kien, Tientsin, and thus providing inland water communication between eastern China and Peking. The depth ranges from 7 to 13 ft., and for long distances it is more than 100 ft. wide. There are no locks, since canal locks are a modern invention, having been devised by Leonardo Da Vinci, who was a contemporary of Columbus, while the Grand Canal was begun about 486 B.C., when the middle section was constructed. The southern part was built about 600 A.D. and the northern part in 1280 A.D. Instead of locks, there are many "barrages," or inclines, up which the flat-bottomed boats are hauled by windlasses, sometimes negotiating a difference of 20 ft. or more in levels. The traffic on the Grand Canal is very heavy, but nowadays mainly local.

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ARTIFICIAL WATERWAYS IN MANY LANDS

FEW of the swift rivers of picturesque and mountainous Norway are navigable for any considerable distance, owing to the innumerable falls and rapids, so inland water traffic has to depend upon the numerous large lakes and a few canals connecting some of them. The Bandak Canal, which gives the city of Dalen water communication with Skien, is narrow and shallow. It climbs several flights of locks on the route from Langesund Fjord to Bandak Lake. Small steamers can thus travel from the Skagerrack, an arm of the North Sea, more than 75 miles into the interior of Norway, both freight and passenger traffic being thus provided for. The photograph shows a vessel climbing the locks at the Vrangfos Falls.

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ARTIFICIAL WATERWAYS IN MANY LANDS

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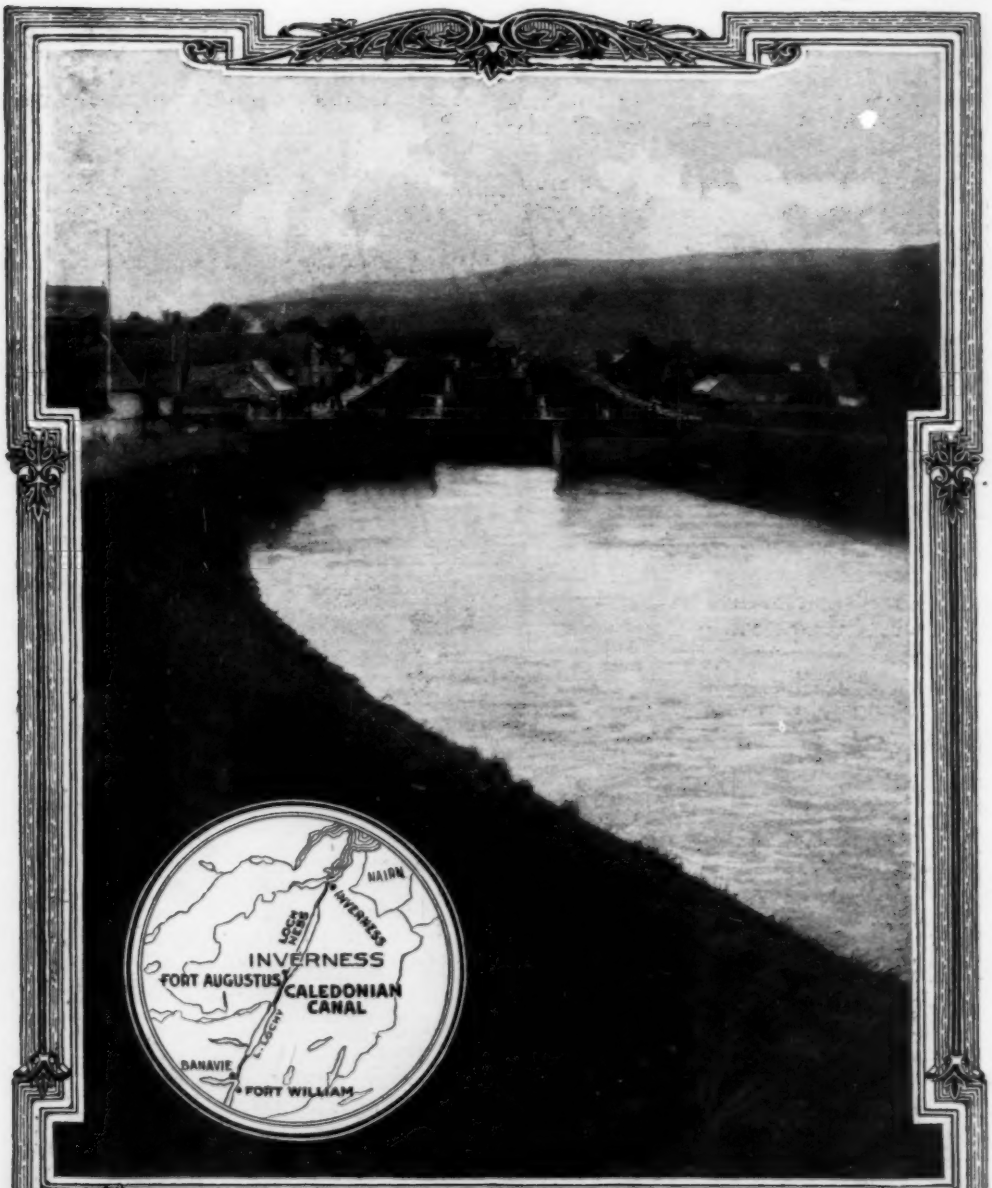

RUNNING in almost a straight line across Scotland from the Firth of Beauly, on the northeast coast, to Loch Linnhe, 60 miles to the southwest, the Caledonian Canal cuts off the northern third of Scotland. It was constructed to enable vessels sailing between the North Sea and the Irish Sea to avoid the 400-mile voyage around the north of Great Britain. James Watt, inventor of the modern steam engine, made the first surveys for this canal in 1773, and the work was begun in 1803 under the engineering direction of Thomas Telford, inventor of the system of road building which bears his name. Only 22 miles of artificial channel was found necessary, large lakes being utilized for 38 miles of the distance. There are 28 locks, each 160 ft. long, 38 ft. wide and with 15 ft. depth of water, the average lift being 8 ft. The photograph shows the locks at Fort Augustus.

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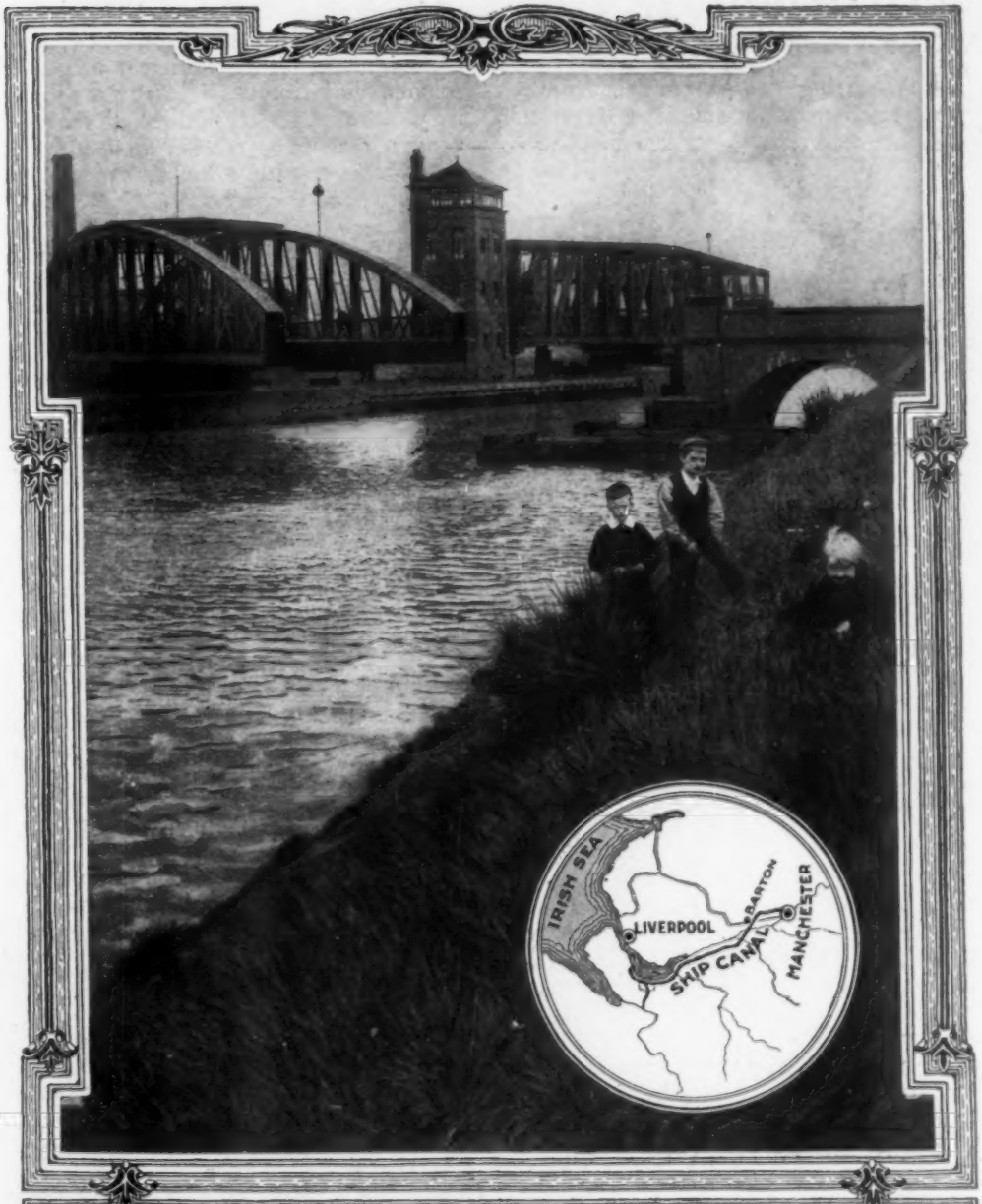
ARTIFICIAL WATERWAYS IN MANY LANDS



THE famous Manchester Ship Canal, constructed for the purpose of enabling sea-going vessels to reach Manchester, England, was begun in 1887 and opened for traffic on Jan. 1, 1894. It is 35½ miles long and cost $75,000,000. It connects with salt water at Eastham, on the Mersey River, about 6 miles from Liverpool. Originally 26 ft. deep, it has been dredged to a minimum depth of 28 ft. Ships 550 ft. long, with a 61-ft. beam, a height above water of 70 ft. and a draft of 27 ft. can use this canal. There are five sets of locks with a total lift of 58½ ft., the highest lift being 16 ft. Thirteen barge canals connect with the ship canal, which handles about 6,000,000 tons of freight a year.

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TRANSPLANTING BIG TREES WITHOUT INJURY

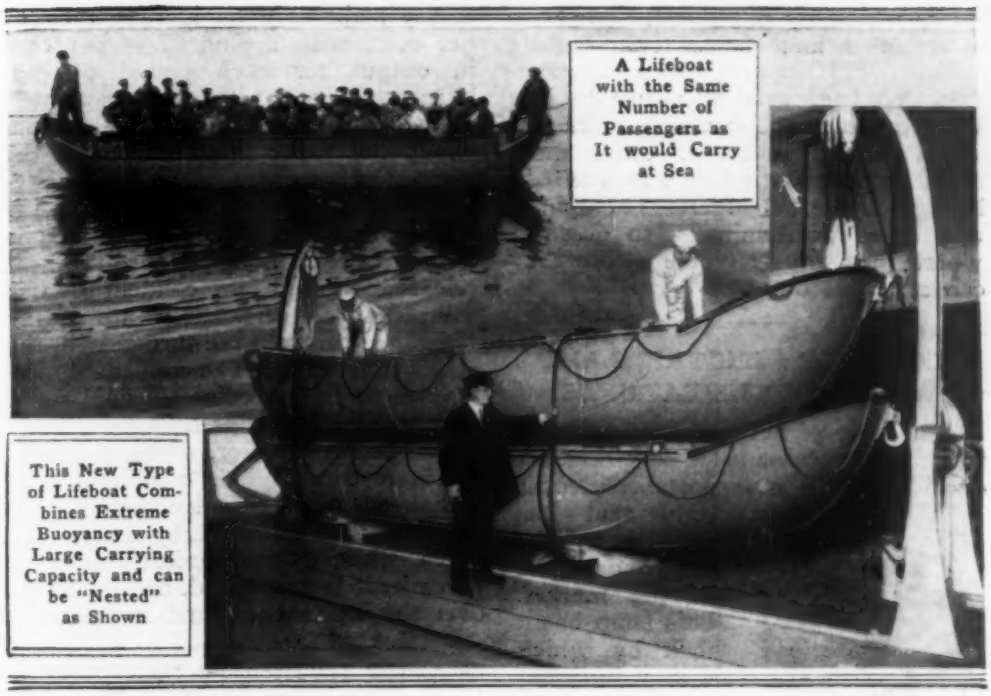
In securing full-grown trees for his new residence, a citizen of Americus, Ga., adopted a method of transplanting elms and other large and heavy trees without injuring them in the slightest degree. A circular trench was dug around the tree, about a yard deep and with a radius of 3 yd. Boards were placed in the trench and secured by steel cables. The tree was then undermined, floored with heavy plank and jacked up. Small roller trucks were placed under the cylindrical box thus formed and timbers laid for a temporary track. Along this improvised roadway the big trees rolled to their new locations, and were planted in pits prepared for them.

Method of Moving Big Trees

REMARKABLE SILOS BUILT OF CONCRETE

Twin silos, 72 ft. high, are the feature of the dairy barns at the Ohio State Hospital at Dayton. The one on the left has a capacity of 450 tons, while its mate is a combined water tower and silo, the top 11 ft. being used for a water tank, from which water under high pressure is supplied to all parts of the barn. The barns are of monolithic concrete with asbestos shingles, and are practically fireproof. A similar structure near Aurora, Ill., is a combined water tank and silo. Its height is given as 79 ft. These structures are carried to a great height, while their diameter is kept small in order that as little space as possible shall be wasted at the top, by reason of the settling of the silage. Experience has demonstrated that concrete silos, even if high in proportion to the diameter, stand uninjured even when adjoining buildings are damaged or demolished by violent storms.

These Twin Silos are Built of Concrete and Stand 72 Ft. High



A Lifeboat with the Same Number of Passengers as It would Carry at Sea

This New Type of Lifeboat Combines Extreme Buoyancy with Large Carrying Capacity and can be "Nested" as Shown

LIFEBOAT WITH DECK AND WATER-TIGHT HOLD

One result of the succession of startling sea disasters of recent years is the activity shown by shipbuilders in an attempt to devise a lifeboat that will be both unsinkable and unsmashable. A lifeboat for which the claim is made that it meets these conditions as nearly as any boat can has recently been put into service. This boat is completely decked, the space below the deck being water and air-tight, and is provided with gunwales that project a sufficient height above the deck to prevent danger of passengers falling overboard. The cross section is wide and low, the bottom of the boat being nearly flat. This construction is designed to enable the boat to ride the roughest sea without capsizing. To prevent, as nearly as possible, the danger of smashing the boat against the side of the ship as it is swung from the davits, the boat is built of the strongest materials throughout, and is provided with a system of heavy cross bracing in the space between the deck and bottom. Each of these boats is capable of carrying from 60 to 65 persons.

NATURAL GAME TRAP FOUND IN NORTHERN MEXICO

A hole in the rocky plateau of Pajarito, near the recently excavated community house of Puye, in northern Mexico, becomes filled with noxious

Poisonous Gases Make Cave a Natural Animal Trap

gases which are of sufficient power to overcome a man if he should venture within. This strange natural phenomenon has been used by native Indians as a game trap for many years. A freshly killed rabbit or other small animal placed in the hole serves as bait, luring coyotes, badgers, porcupines, and other wild animals, to descend, where they are overcome before they can scramble out.

PORTABLE ELECTRIC LAMP WITH NOVEL FEATURES

A number of new features designed for greater convenience in using are embodied in a new portable electric lamp that has recently made its appearance on the market. This lamp has a hook by which it may be hung up, a spring clamp for attaching it to an upright of a bed or chair, and, most important of all, a rubber suction cup by which it may be fastened in a horizontal position to any smooth surface, such as a mirror or wall. It is supplied with a cord, 10 ft. long. This cannot become tangled, as the portion not in use coils up automatically in a receptacle in the base of the lamp.

POWER NOW OBTAINED FROM MERCURY VAPOR

The latest source of power for commercial use is mercury vapor. Experiments by a large electric company have demonstrated that by heating mercury and using its vapor to drive engines just as steam is used, the capacity of a steam plant may be increased by 66 per cent, with a gain of 44 per cent in output for each pound of coal burned. Mercury is vaporized at 677° F. in a specially designed boiler, from which the vapor is conducted to the nozzles of a turbine. The power having been exhausted in revolving the wheels, the vapor is condensed in coils within a steam boiler, where the heat released through its condensation is utilized to convert water into steam, and other turbines are turned with the steam thus made. The condensed mercury, now in its ordinary liquid form, is drawn off and runs back by gravity to the mercury boiler, where the process is repeated. This combination, it is figured, gives a fuel economy very close to that obtained by Diesel engines, while its mechanical simplicity gives it, it is contended, an advantage over the internal-combustion engine.

WATER HYDRANT IMBEDDED IN EUCALYPTUS TREE

The rapidity with which the eucalyptus tree grows is illustrated in the yard of the old Hoyt's School at Menlo Park, Cal. The pipe seen in the center is a 2-in. water hydrant and is still in use, although the tree has grown entirely around it. The trunk of the tree measures 19 ft. in circumference at the level of the valve.

¶ In power-transmission ropes, failure generally begins at the core, where the most severe rubbing of fiber against fiber occurs, and not, as is generally believed, at the surface.

USE MOTORBOATS TO SCOUT ICEBERG DANGERS

Steamships of a line cruising between Liverpool and Montreal are now equipped with motorboat ice scouts, as a precaution against an encounter with icebergs. Each vessel carries two motorboats, the size of a lifeboat, fitted with 30-hp. motors, with wireless and with submarine signaling devices. In foggy weather, these motorboats are sent ahead to act as scouts, to report to the liners by wireless the approach of icebergs or other dangers. In the event of a collision, the motorboats will be available for towing the lifeboats, should it be necessary to abandon ship. Other transatlantic steamers are likewise to be equipped with these small patrols.

FOLDING DEVICE MAKES ANY CHAIR A "HIGH CHAIR"

A device which converts any chair into an infant's high chair has been invented. When not in use by the child it may be quickly detached and put out of the way. The device is a seat with straps and hooked attachments for grasping the back of the chair. The grips are covered with rubber so as not to mar the finish of the chair, while holding the seat securely in place. A strap in front permits the youngster to be fastened so that there is no danger of a fall.

MOWING MACHINE MADE INTO A MOTOR TRACTOR

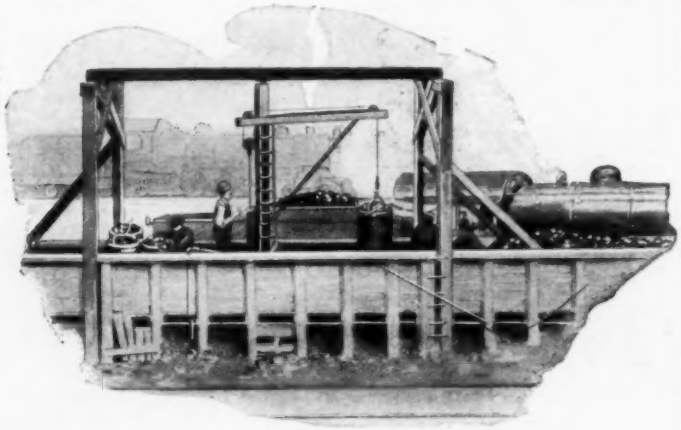
A homemade farm tractor that is a combination of an old mowing machine and a gasoline engine is being used to draw a plow on a farm near Newell, S. D. It is crude in appearance, but will draw a 12-in. breaking plow, 5 in. in the ground, at a rate of about two miles an hour. The old mowing machine, stripped of its knives and machinery, is propelled by a 2-cycle 4-hp. marine engine bolted to the frame just back of the seat. Power is transmitted by a chain running over the old gears of the mower. A solid wooden wheel, mounted in an iron fork and provided with a gas-pipe "tiller," is pivoted on the end of the sawed-off pole to serve as a steering gear. Circulation to cool the motor is provided by a bucket of water on the platform behind, a coil of pipe hung under the pole, and three pieces of hose connected with the engine pump.

Homemade Farm Tractor Built of an Old Mowing Machine Plus a Marine Engine

COALING DEVICE FOR LOCOMOTIVE

In a large switchyard where many locomotives coal, one railway has installed a coaling device which operates quickly and with a minimum of labor. Between the tracks is the coal pit, into which is dumped from time to time coal for the tenders. As each engine draws up, buckets filled with half-ton

loads of coal are hoisted by a pneumatic lift and swung over to the tender, dumped, and returned quickly. The entire operation takes but a fraction of the time hand coaling requires, and the actual labor involved is limited to filling the buckets, a number of which may be loaded at dull times and held in readiness for the rush hour.



A Simple Contrivance for Coaling Engines Quickly

GRADUATED GLASS WITH ZIGZAG SCALE

A graduated measuring glass having the divisions marked on a zigzag line instead of on a vertical line, as has been the common practice, has been brought out recently in Germany. It is thought that increased accuracy and ease in reading the measurements can be secured with a scale arranged in this way.

¶ A 35-mile telephone cable is being laid between Vancouver and Vancouver Island, Canada. It weighs 560,000 lb., cost $100,000, and $20,000 will be spent in laying it.

TO MAKE FLAX STRAW INTO YARN AND TWINE

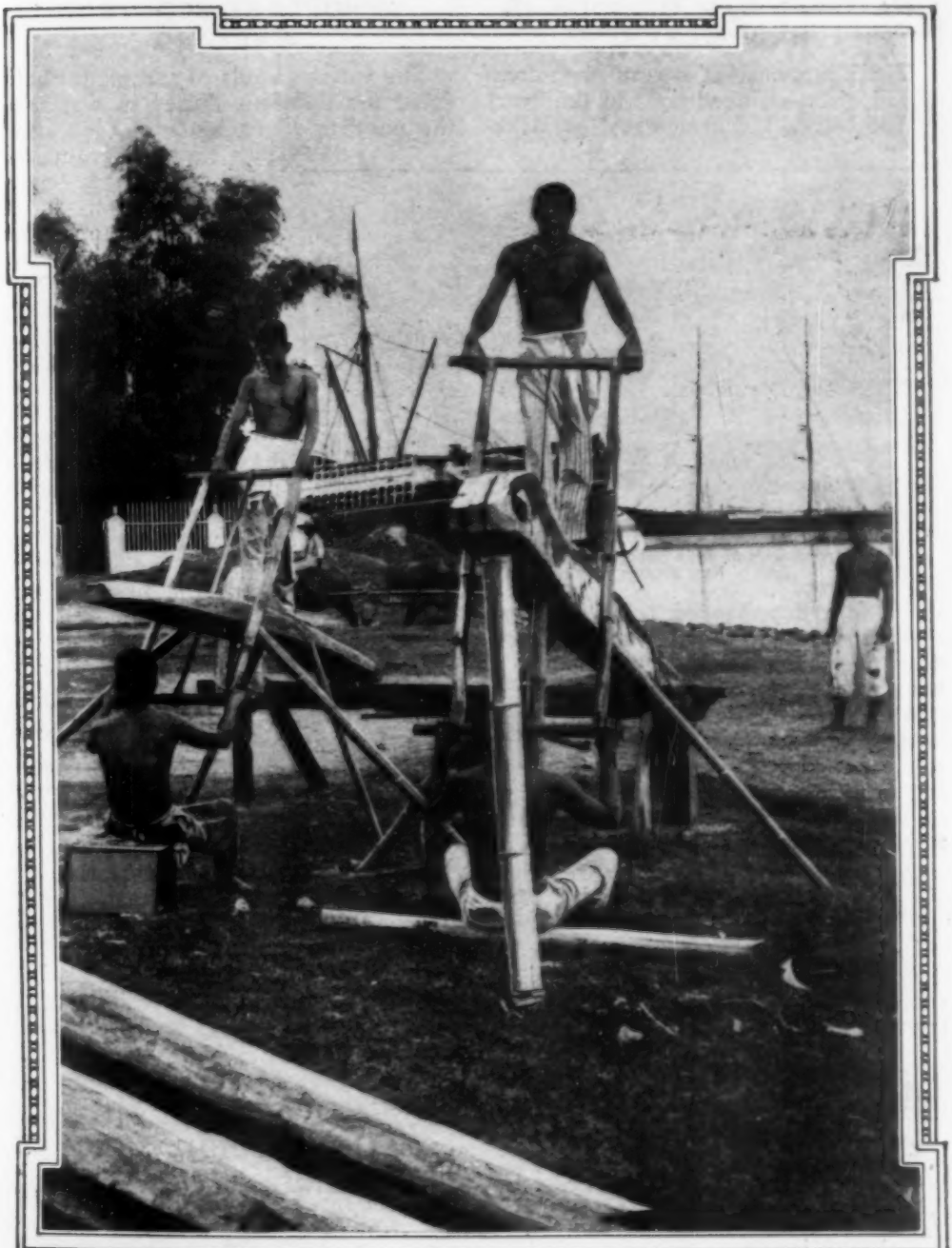
Tests made at English mills on flax straw grown in Montana indicate that this material, heretofore regarded as practically a waste product, can be made successfully into all varieties of yarn and twine, including binder, packing and shop twines. The process of manufacture is simple and inexpensive, the flax straw being taken direct from the field and treated rapidly, then dried in the sun and passed through special machinery that forms it into yarn or twine. It is believed that this treatment can be applied with commercial success to flax straw grown in any part of the United States. If this proves to be true, a profitable addition will be made to the resources of American farmers. In 1912, about 3,000,000 acres were in cultivation under flax in the United States.

BIG GLASS TANK USED BY DIVERS BURSTS

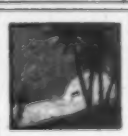
A glass tank holding 8,000 gal. of water, which was part of the equipment of the Bermuda aquarium, burst when being used by two moving-picture performers in staging a diving scene. The rush of water drew the performers across the jagged edges of the broken glass, injuring them severely. It is believed that the sudden strain caused by the plunge of the divers caused such pressure within the tank that the glass could not resist it, and one side gave way with disastrous results.

¶ A tube containing $5,000 worth of radium, lost in a Liverpool infirmary, was found in the garbage of the institution. It had been swept up unnoticed.

PRIMITIVE SAWMILL STILL USED BY FILIPINOS



SAWMILL installations in the Philippine Islands do not require a large investment. The timber is braced at an angle by bamboo pieces, the lower end resting on a crosspiece of timber. One sawyer mounts the piece to be cut, while his mate seats himself beneath the stick. A saw blade mounted in a bamboo frame is worked back and forth by the two men.



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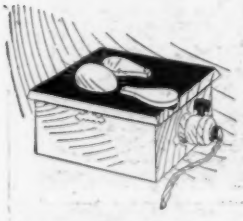
NATURAL DAM OF SODA IN NEW MEXICO

There is a curious natural dam composed of crystallized soda in the heart of the Jemez Mountains of New Mexico. The deposits of some mineral springs have gradually accumulated until they have piled themselves into a snowy-white wall 30 ft. high. The entire surface of the dam is overlaid with beautiful leaf designs, and its edges are fluted with stalactites hanging in little groups. Under the edge of the dam a little mountain stream flows out from the rocks behind.

Natural Dam of Soda Deposited by Mineral Springs in New Mexico Mountains

EGG TESTER TO REPLACE CANDLE

A compact egg tester has been patented to take the place of the rude contrivances used by many chicken raisers and grocers. An electric light in a neat box, 6½ by 6 by 3 in., shines through two beveled-edged slots in the top. The outside of the box is covered with black felt cloth and the inside is lined with white asbestos. The strong light shining through eggs placed in the slots makes it possible to judge their quality even in daylight.



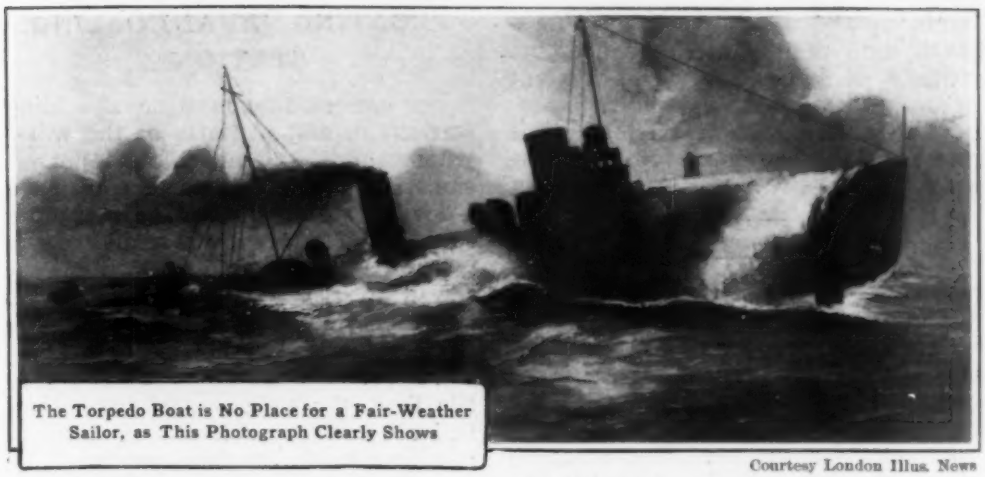
AEROPLANE SCOUTS IN WARFARE

The various kinds of aeroplanes best fitted for different duties in war and the number of machines of each kind that should accompany an army in the field have been discussed at length by an officer in the British Royal Flying Corps. At the beginning of a campaign fast single-seated machines that have a large radius of action are needed to ascertain the strength of the enemy. Larger two-seater aeroplanes that can readily be transported on the road when the weather is bad he considers much the best for reconnaissance of the enemy's position during the campaign.

As an army in the field would require machines of both types, he has given the total number of aeroplanes needed by a field army as 15 squadrons of 12 machines each. They are parceled out, according to his plan, among the various divisions as follows: Two squadrons of fast single-seater monoplanes to accompany the army troops; one squadron of two-seater monoplanes to go with the cavalry divisional troops; six squadrons of two-seater biplanes and six squadrons of fighting machines to work with the divisional troops, one squadron of each with each division.

TORPEDO BOAT IN STORM ALMOST SUBMERGED

The low freeboard of torpedo boats renders them particularly subject to the action of the huge waves met with in storms. A photograph taken from the fighting top of a battleship shows clearly the plight of the torpedo boat in heavy weather. Tons of green water break upon the low deck, washing overboard everything not firmly



The Torpedo Boat is No Place for a Fair-Weather Sailor, as This Photograph Clearly Shows

Courtesy London Illus. News

lashed. First the bow and then the stern are lifted clear, taxing the rigidity of the frame to the utmost. However tightly the hatches are battened down, considerable leakage results.

CURIOUS CEREMONY OPENS ELECTRIC LINE

The opening of the first electric street-car line in Constantinople recently was marked by a curious ceremony, in which two lambs were sacrificed upon the tracks, the rails being smeared with the sacrificial blood while prayers were offered by Mohammedan priests for the success of the undertaking. The officials of the new line took part in the

Sacrificing Lambs upon the Rails of the New Street-Railway Line in Constantinople

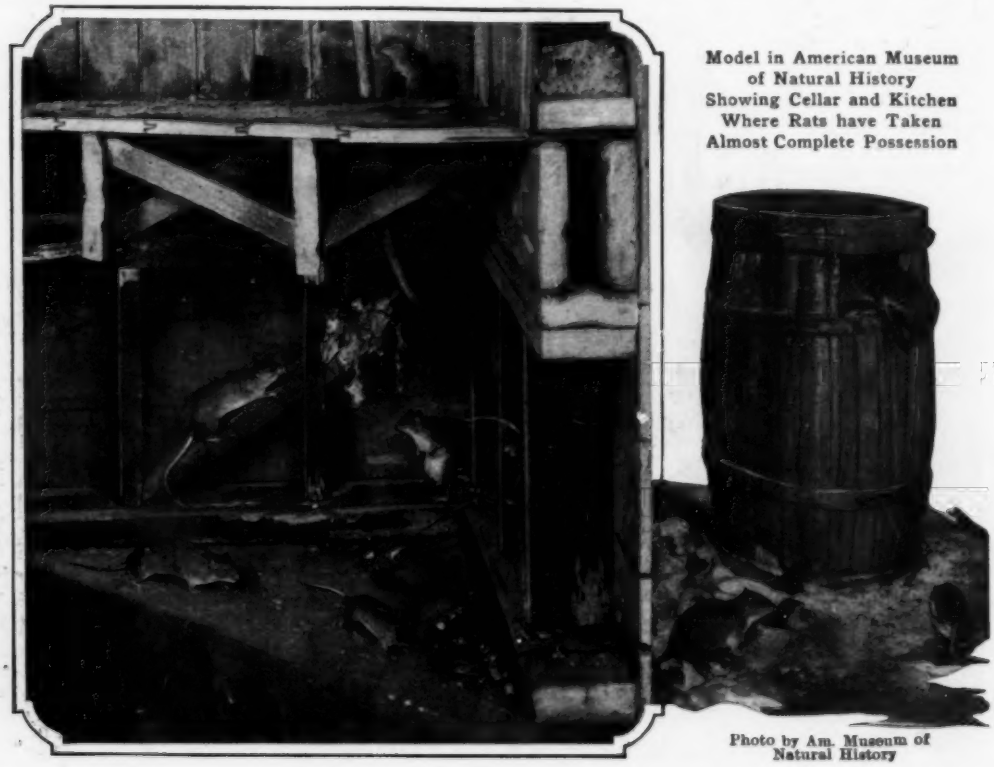
ceremony and are shown in the photograph with their hands extended, the attitude of invocation. This ancient rite with its modern adaptation presents strange contrasts. The car line runs from the Karakeny bridge to Sirkedji, within the Ottoman capital.

MODEL OF RAT-INFESTED HOUSE

A model of a rat-infested kitchen and cellar in San Francisco has been installed in the American Museum of Natural History as an example of what happens when proper precautions are not taken for the exclusion of these disease-bearing animals. Side by side with this model is one showing a house and barn protected by rat-proof construction. The importance of such protection is evident in view of the fact that rats are known to be the carriers of the germs of some of the most dreaded diseases, including the bubonic plague.

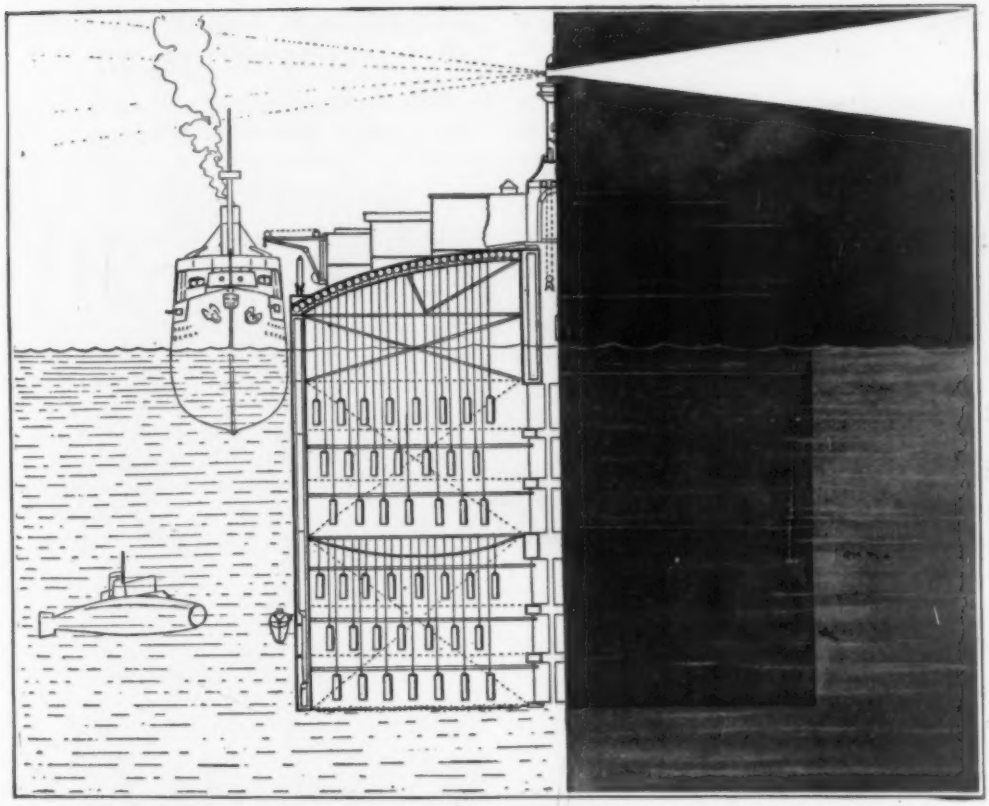
FLOATING NAVAL COALING STATION

For nations that need naval coaling stations in distant parts of the world where they have no colonial possessions, a Russian inventor has designed a floating storehouse for fuel and other supplies. Manned by a small crew of men, the floating naval base can be towed to any advantageous position and anchored, ready to receive supplies from colliers and distribute them to warships. On the approach of a hostile fleet, the entire naval base, crew and all, can be sunk out of sight, to reappear again as soon as danger is past. As patented, the floating storehouse is very much like a huge diving bell, cylindrical in shape, with double walls and roof containing compressed-air tanks for regulating its height in the water. It has no bottom except a wire netting and is usually partly filled with water. All coal, petroleum, and other naval supplies are received



Model in American Museum of Natural History Showing Cellar and Kitchen Where Rats have Taken Almost Complete Possession

Photo by Am. Museum of Natural History



A Floating Naval Coaling Station Which can be Anchored Anywhere and Sinks Out of Sight Whenever Danger Approaches

and stored in small water-tight drums. From the receiving cranes on the roof, the drums are moved to a well in the center, lowered to the proper depth, and shunted off through windows in the well upon concentric tracks, where they remain suspended in the water until needed. All the handling is done by automatic machinery.

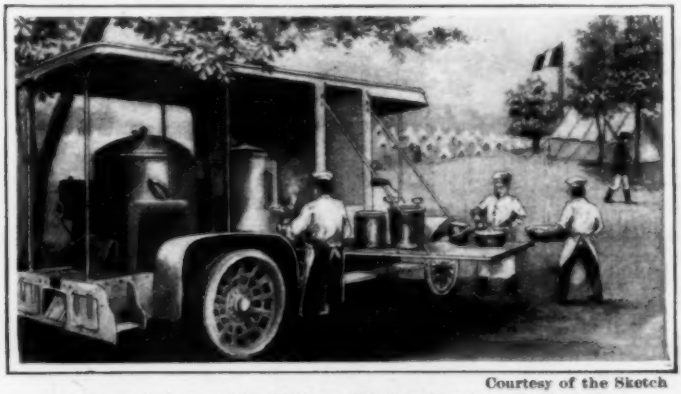
QUARRYING FOSSILS IN WYOMING

The bones of many antediluvian monsters have been found in the rocks of Wyoming, and regular fossil quarries exist, where bones and often a complete skeleton of extinct creatures may be exhumed. Uncovering these fossil remains, however, is the least of the task confronting the scientist. Each bone must be inclosed in a protective cast of plaster, carefully wrapped and numbered with exactness. Bones shipped without such precautions would surely be broken before they reached their destinations in the laboratories or museums of scientific institutions.

Taking Out the Bones of Prehistoric Monsters from a Wyoming Quarry

NEW AUTOMOBILE MILITARY FIELD KITCHEN

A military field kitchen mounted on a large automobile truck, as shown in the accompanying picture, has been designed for the French army. The cooking boilers are mounted on a platform back of the driver and protected by a canopy, and the fully equipped kitchen, in such compact form, is able to follow the rapid movements of the army in the field.



Courtesy of the Sketch

A French Automobile Military Kitchen Ready to Follow the Army in the Field

EMERGENCY HOISTING CAGE FOR MINE RESCUE

To aid in mine-rescue work when the regular hoisting apparatus has been damaged or disarranged, an emergency portable and collapsible hoisting cage has been patented and dedicated to public use by the chief mining engineer of the U. S. Bureau of Mines. The emergency cage consists of a collapsible frame of two flat bars, approximately elliptical in shape and welded together at the ends so that they serve as uprights and as top and bottom frame parts. Bolted inside of this frame are a number of horizontally arranged hoops which brace the frame and form skeleton sides. The collapsible cage can be easily transported and can be put together ready for use in a few minutes.

APPARATUS FOR FORCING RESPIRATION

The one-man resuscitating apparatus which was described in Popular Mechanics Magazine some time ago is illustrated by the picture shown here. Its purpose is to enable one man to revive a person who has been nearly drowned, by moving his arms and compressing his abdomen with a rhythmic motion to force respiration. The apparatus consists of a flat, inclined rest for the trunk of the body and two metal arms pivoted under the shoulders. The person to be resuscitated is stretched out on the apparatus with his hands over his head strapped to the pivoted arms. A broad strap placed across the lower chest and abdomen is fastened to ropes which draw it tight when the arms are swung to a vertical position. As the arms are moved up and down the victim's chest is alternately expanded and compressed. One man can

Photo by Paul Thompson

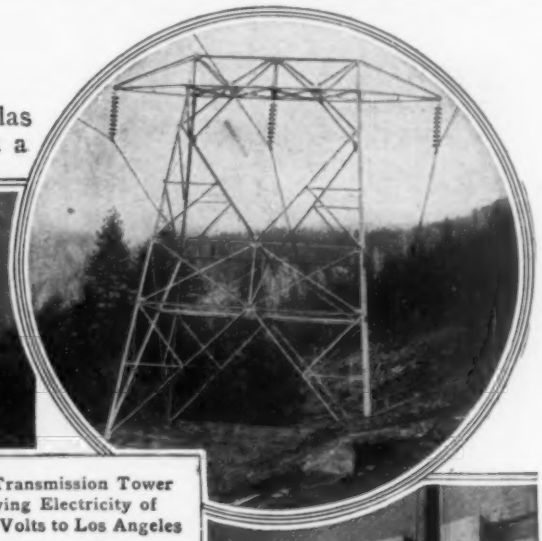
Life-Saving Apparatus for Reviving Unconscious Persons

operate the apparatus with one hand while, with the other, he holds the victim's tongue to prevent it from falling back into the throat and obstructing the air passages.

BIG CREEK DAM NOW FINISHED

East of Fresno in the Sierra Nevadas lies the Big Creek basin, where, at a cost of over $12,000,000, a great dam has been built, which transforms Big Creek, a branch of the San Joaquin River, into a great reservoir, supplying the power to light the city of Los Angeles, 241 miles away. To build this dam it was necessary to construct a mountain railroad with heavy grades, to make a wagon road a hundred miles in length, and to drill a 12-ft. tunnel six miles through solid rock. Two concrete power houses stand sentinel on either side of the great dam, and water, dropping 2,000 ft. in steel pipes, strikes the wheels with enormous force. Carrying the electric current, at a pressure of 150,000 volts, to Los Angeles, two lines of aluminum on steel towers form one among the longest commercial-transmission lines in America. The first current was sent over the new line on November 7, 1913, and 80,000 hp. are now available for use.

Mountain Railroad Showing Heavy Grades



Steel Transmission Tower Carrying Electricity of 150,000 Volts to Los Angeles

Completed Dam with 6-Ft. Steps

INDIAN WOMEN MAKE FINE PILLOW LACES

Teachers provided by the Indian Bureau have been successful in teaching Indian women on the reservation

Indian Lace Industry at Pala, California

near Redlands, Cal., to make fine pillow laces. It was noted that these women were remarkably proficient in making baskets, and as there seemed to be no reason why their dexterity and eye for color and design might not be directed along lace-making lines, the experiment was undertaken in the expectation that they might be able to supply a portion of the American demand for fine laces now seeking the products of France, Italy and Belgium. The new industry is well under way, and the women are turning out some beautiful designs.

¶Waste used in street-car journals in Denver is cleaned and used over again.

FLOWERS LEND CHARM TO BUSY CITY STREETS

The floral window box, which has become an established feature in the business districts of many of the larger cities, is a form of ornamentation that has taken, and is likely to retain, a strong hold on the sympathies of city dwellers. The practice of using miniature flower gardens in this way for relieving the monotony of the brick and terra cotta and asphalt of business sections has developed in this country within the last few years, although it has been common in Europe for a considerable period. Apparently, this movement is only in its beginning, since each year sees more boxes installed, and more foliage and flowers ornamenting the entrances and drooping from the window ledges of business buildings. Last summer there was scarcely a block in the loop district of Chicago, famous as one of the most congested districts in the world, that was not provided with one or more of these refreshing floral displays. The foliage of the window box, however, is not exclusively a summer feature, since in many of the boxes the flowering plants are replaced with evergreens on the approach of winter. There is also a tendency to install plants for the benefit of the workers in a building, and many flower boxes placed in positions too high to be seen from the street are being maintained for the influence they have on the employes and clients of business firms.

Experience has shown that growing plants can be maintained with little trouble in the windows of the downtown buildings, but that a better type of box is required than is commonly used in the home. The boxes are nearly always of metal, to avoid the annoyance and damage from leakage. Sometimes the metal box is incased in a stone or terra-cotta box that is ornamented in an artistic way and made an architectural feature of the building, and in some of the latest buildings this feature formed an important point in the design. The best results in the culti-

Window Boxes Brighten Windows of Bank Building
Below: Elaborate Floral Display of Chicago Hotel
Flowers in Bloom over Entrance to Hotel
Artistic Window Box
Arch of Hotel Lobby
The Front of a Newspaper Building
Terra-Cotta Window Boxes That Form Architectural Feature of Mercantile Building

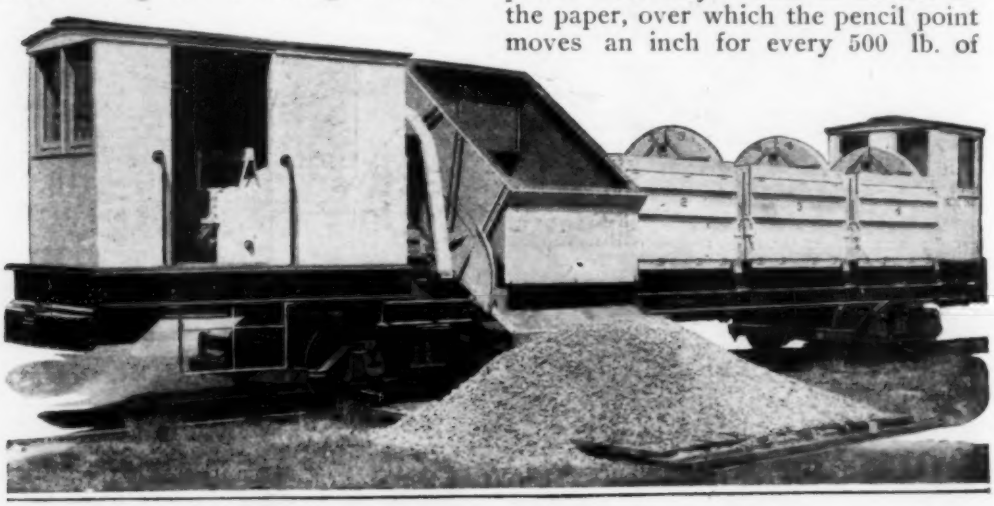
vation of plants seem to have been secured with subirrigated boxes, largely because these require a minimum of attention. With this class of box the water is poured through a tube into a false bottom from which it is drawn up through sponges into the earth around the roots of the plants. In planning window boxes the tendency was formerly to use a miscellaneous selection of plants without much attention to grouping or effect, with a result that was seldom satisfactory. The expert florist is now more often called in, and an attempt is made to secure strong effects, consideration being given even to the direction in which the window faces. For winter foliage various kinds of evergreen are used, such as arbor vitae, Norway spruce, box and pine.

NOVEL DUMP CAR OPERATED BY ELECTRICITY

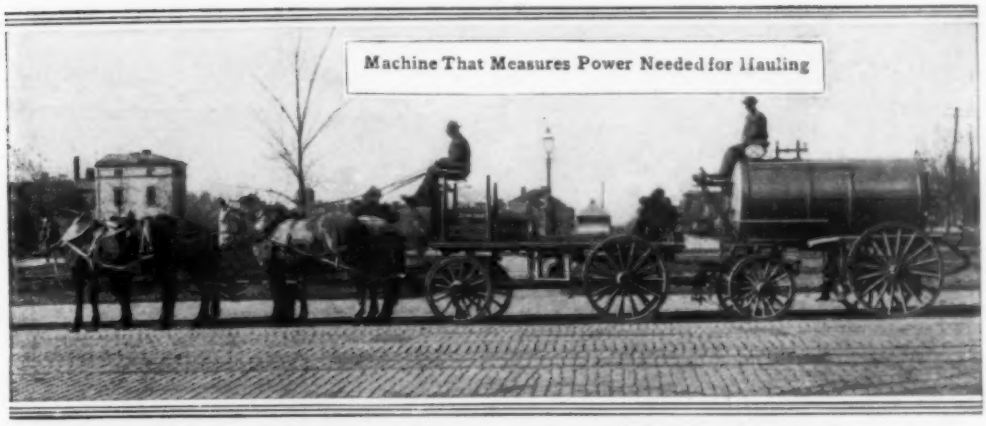
A Connecticut interurban system, operating a network of electric lines throughout the state, has adopted a multiple-body electric dump car having several novel features. Four separately operable compartments, each of 6-cu.-yd. capacity, are so hinged that they may be dumped over either side of the track. In the cab is a 10-hp. motor designed for tilting the compartments in unloading, and any one or all of them may be dumped at a time. It takes less than one minute, it is stated, to unload the car when the compartments are dumped separately. The car is self-propelling, four 40-hp. motors giving sufficient power to drive the loaded car at approximately 12 miles an hour. Only two men are required to operate this car, resulting in a direct labor saving.

DYNAMOMETER RECORDS PULL ON ROADS

The newest machine acquired by the United States Department of Agriculture for gathering data is a dynamometer for recording the "pull" that is required of horses or other motive power to draw vehicles over a given road. The dynamometer is nothing more than a standard city dray, from the bed of which are suspended two coil springs connected with a shaft, rack and pinion; a band wheel, carrying a pencil motion; a platen and a series of feed rolls, over which a metallic-surfaced paper is drawn. A chain and gearing from the hub of a rear wheel operates the mechanism. The pull on the tongue of the dray is transmitted through the coil springs, the compression of which measures the power necessary. This is shown on the paper, over which the pencil point moves an inch for every 500 lb. of



Multiple-Body Dump Car Used by Connecticut Electric Line



Machine That Measures Power Needed for Hauling

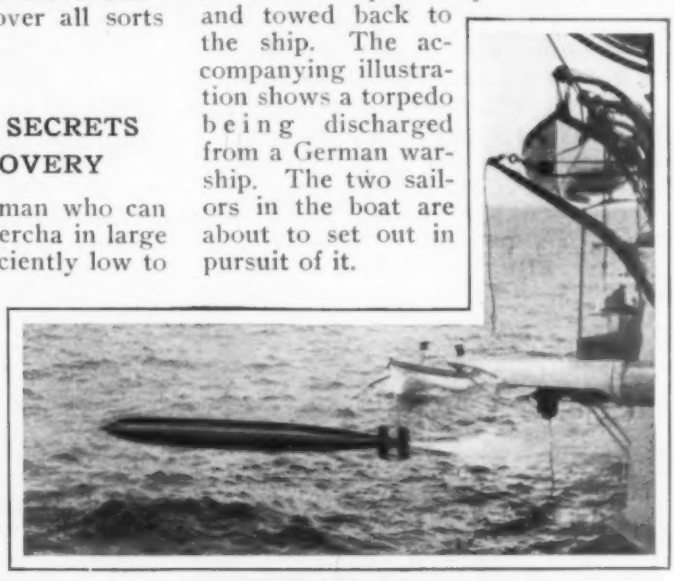
draft exerted. A record of 20 ft. of paper represents one mile of travel. All sorts of street-cleaning machinery, water sprinklers, garbage, dump and ash carts, and the like, may be tested by hitching them on behind the dynamometer, the pencil marking accurately the power needed to move them at varying speeds and over all sorts of road surfaces.

SOME VALUABLE SECRETS AWAITING DISCOVERY

A fortune awaits the man who can produce artificial gutta-percha in large quantities at a price sufficiently low to warrant its use instead of the genuine article, the supply of which is fast diminishing. Cork is another substance of everyday use for which no satisfactory imitation has been provided, the only substitute thus far produced being paper treated with paraffin wax, but this material cannot be used for corking wine bottles. One of the most valuable processes unknown to us is the production of iron that will not rust or decay. That this secret was known to the ancients is proved by an iron monument at Delhi, India, which has stood exposed to the weather for centuries without rusting or decaying.

GERMAN WARSHIP IN TORPEDO PRACTICE

Owing to the fact that the destruction of a torpedo means an expenditure of about $2,000, the torpedoes used in practice carry no explosive, and when the force is spent they are recovered and towed back to the ship. The accompanying illustration shows a torpedo being discharged from a German warship. The two sailors in the boat are about to set out in pursuit of it.



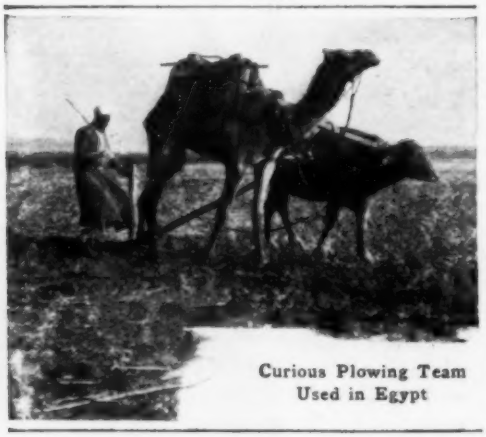
Torpedo Photographed at the Moment of Discharge from a German Warship

The escape of the compressed air, which launches the torpedo, and the whir of the propellers in the air before the plunge into the water produce an uncanny noise having a decidedly plaintive note, which creates a weird and "creepy" feeling in the novice who chances to hear it for the first time.

Fun in the New Swimming Hole, Made of Concrete, in the Back Yard

EGYPTIAN FARM TRACTOR 1914 B. C. MODEL

Agriculture in Egypt is still conducted along old lines, and the sight of a "fellah," as the lower-class rural natives are called, plowing with a camel and a water buffalo yoked together, is not uncommon. The plow is of wood and of the simplest possible construction. It scarcely more than scratches the surface of the soil, but because of the unrivaled fertility of the alluvial deposits along the course of the Nile the crops raised are fairly large.



Curious Plowing Team Used in Egypt

CONCRETE SWIMMING TANK EASILY CONSTRUCTED

Cement walls 8 in. thick, not reinforced, form this swimming tank, which is 12 by 20 ft. in size. It is 4 ft. deep at one end and slants to 5 ft. at the other. The water is pumped in by a gasoline engine used in farm work, and there is a valve at the bottom of the tank connected with a tile so that the water may be changed, and the tank scrubbed as often as need be. The whole thing cost but $90, and is far better for the children than swimming in open ponds or small creeks.

SEEK OLD GUNS BENEATH THE SEA

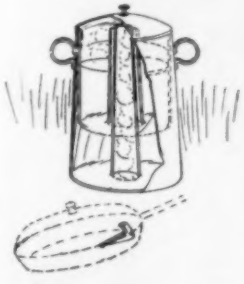
A thousand brass cannon, sunk in May, 1692, when the combined English and Dutch fleets worsted the French fleet in the battle of La Hogue in the English Channel, will be raised if the French ministry of the marine receives satisfactory bids. For 222 years these old guns have lain at the bottom of the channel, and only recently a salvage contractor asked permission to raise them. Upon investigation the naval authorities of France concluded that the project was feasible.

ONE CAUSE OF THE HIGH COST OF LIVING

According to a report from the United States Department of Agriculture the present high cost of living is partly due to the decreasing number of beef and farm cattle raised and their increased cost during the past two years, as follows: Compared with January 1, 1912, milch cows decreased 202,000; other cattle, 1,230,000; sheep, 880,000, and swine, 4,232,000. The price of these various animals increased, however, in average value per head, as follows: Milch cows increased $5.63; other cattle, $5.16; sheep, $0.48, and swine, $1.86. In total value milch cows increased $107,369,000; other cattle, $159,581,000; sheep, $21,609,000, and swine, $79,781,000.

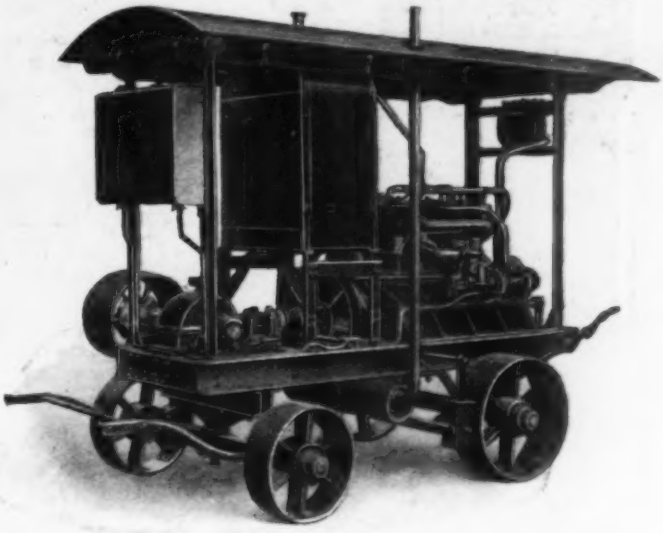
NEW ODORLESS COOKING UTENSILS

In the new down-draft cooking utensils which have just been patented no odors are allowed to escape and cooking is made entirely odorless. Each utensil has a tightly fitting cover and a tube running down through the center to a hole in the bottom, to carry all odors and vapors back into the stove. The tube has an added advantage in furnishing a larger heating surface. The down-draft idea is to be applied to odorless saucepans, double boilers, frying pans, and other common cooking utensils.



LOCOMOBILE DESIGNED TO BURN HEAVY OIL

Among the recent developments in engine construction in France is a locomobile, or portable power plant, so designed that it will readily burn the heavier grades of oil. This improved form of motor is of practically all-metal construction, and is mounted on wheels with wide steel-tired rims. This type of locomobile is built with capacities ranging from 3 to 50 horsepower.

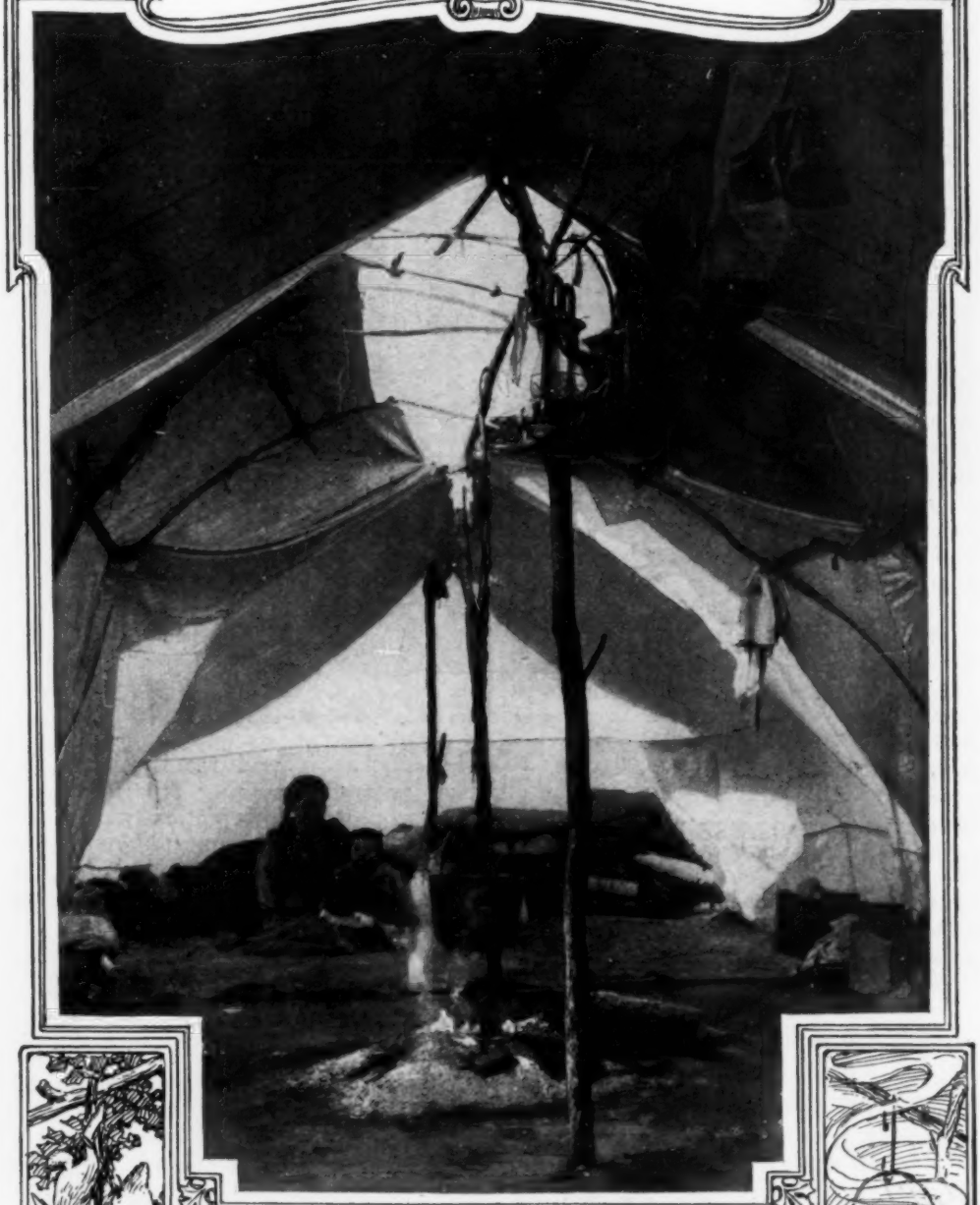


French Locomobile That Burns Heavy Oil

PIPE LINE TO SUPPLY OIL FOR NAVAL VESSELS

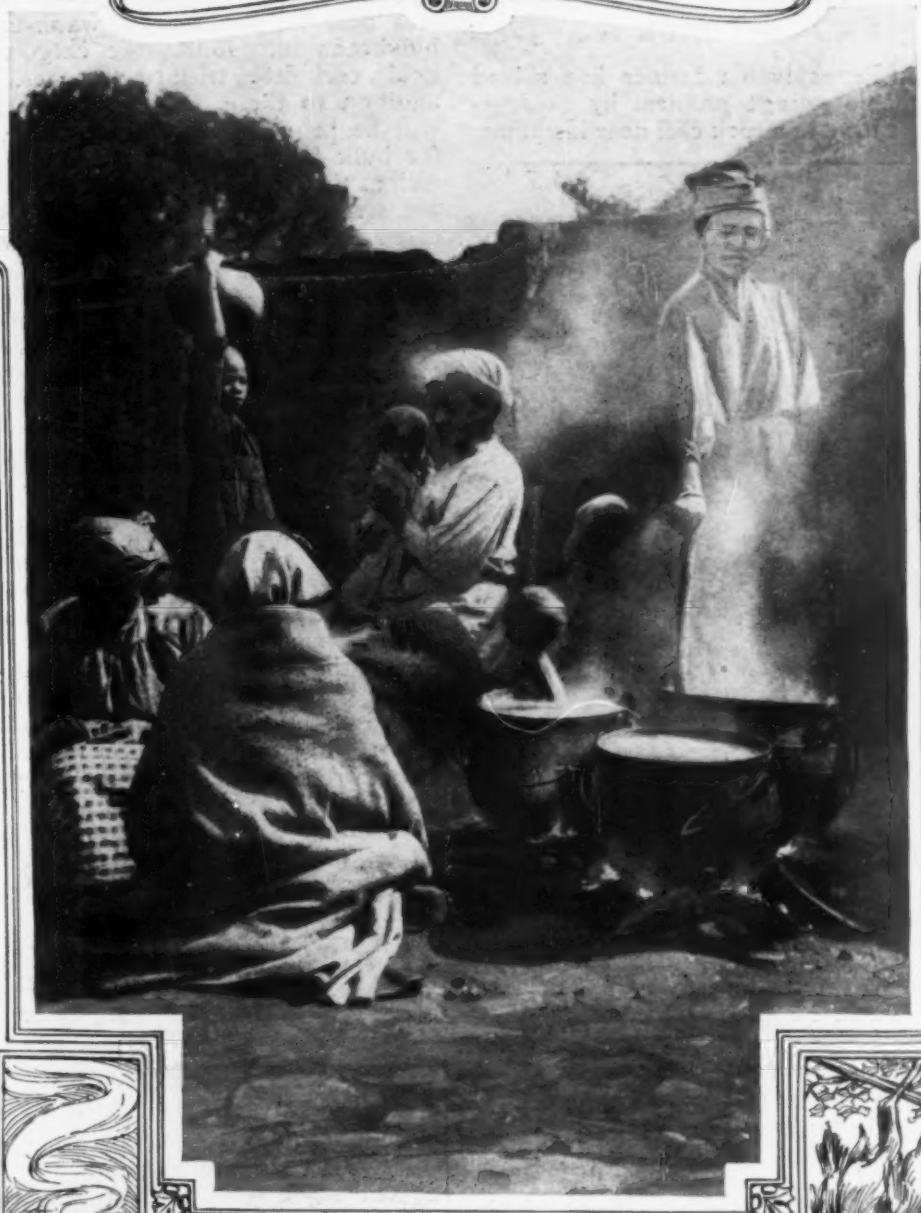
A bill has been presented in Congress providing for the construction of a pipe line from the oil fields of Oklahoma to a port on the Gulf of Mexico, which is designed to bring directly to naval vessels of the United States the fuel oil which they are using in rapidly increasing quantities. Over 400,000 bbl. of oil were required for naval use in 1913, and it is estimated that 700,000 bbl. will be needed for 1914. A national pipe line under the control of the Navy Department will tend, it is believed, to reduce the cost of this fuel to the government.

THE FIREPLACES OF ALL THE WORLD—V



ON the western reservations, many of the American Indians still live in tents which differ in few important respects from the tepees of their ancestors. Woven fabrics manufactured by white people have replaced the deerskins of which the aboriginal tents were made, and larger shelters are thus possible, but they still retain the primitive methods of housekeeping. Food is cooked in kettles over a wood fire, and the hole in the center of the roof to let the smoke out is as much a feature of a modern canvas tent as of the "wigwam" of a hundred years ago.

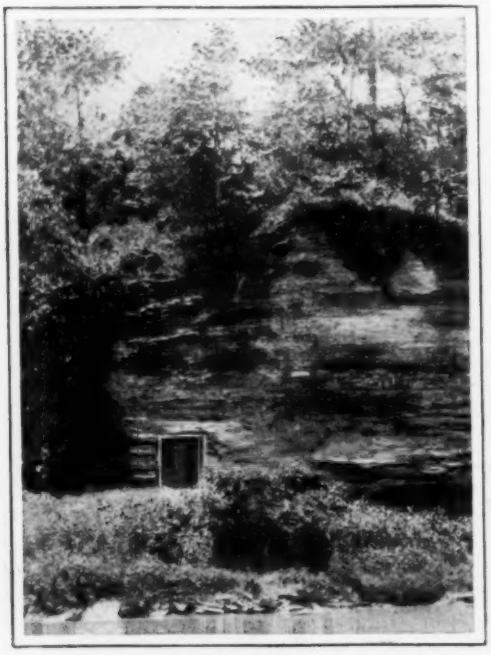
THE FIREPLACES OF ALL THE WORLD—VI



AMONG the most curious and interesting of the natives of Africa are the members of the Baralong tribe of the Bechuana race. For many years they were almost constantly in arms against the white settlers in South Africa, but now profess allegiance to the British crown and are governed by a British protectorate with headquarters at Mafeking, Cape Colony. The Baralongs are the most accomplished blacksmiths of all the South African natives, the metal iron being their tribal fetish. The photograph shows a typical group of Baralong women cooking over a wood fire outside of one of their characteristic dwellings, a mud hut with thatched roof.

ARTIFICIAL CAVE FOR COLD STORAGE

A Pennsylvania farmer has solved the cold-storage problem by excavating a cave in a rock cliff near his home.



Rock Cliff and Entrance to Artificial Cave Made by Pennsylvania Farmer

This artificial cave is in the form of a room 10 ft. square and 12 ft. high, and is provided with a strong door and a lock.

COLLIERS FOR SERVING THE PANAMA CANAL

Two colliers of a special type are to be built for transporting coal to the Panama Canal for government uses. Each of these vessels is to have an over-all length of 522 ft., beam of 62 ft., and a draft of 28 ft. when fully loaded. They will have twin screw propellers and will be capable of making a sea speed of about 16 miles an hour under full load. The designs provide for the carrying and handling of both cargo coal and fuel oil. The vessels are to be built with double bottoms throughout and will be fitted for carrying water-ballast tanks. They will also be divided by water-tight bulkheads into four large cargo-coal holds, each fitted with two hatches. In addition to these, four compartments will be provided at the forward end for bulk freight or oil, and these, as well as the machinery compartments at the stern, will be separated from the cargo holds by cofferdams. These ships will carry wireless equipment and will have comfortable quarters for officers and a crew of about 146 men. Each vessel, equipped with overhead coaling gear, is expected to cost a trifle more than a million dollars.

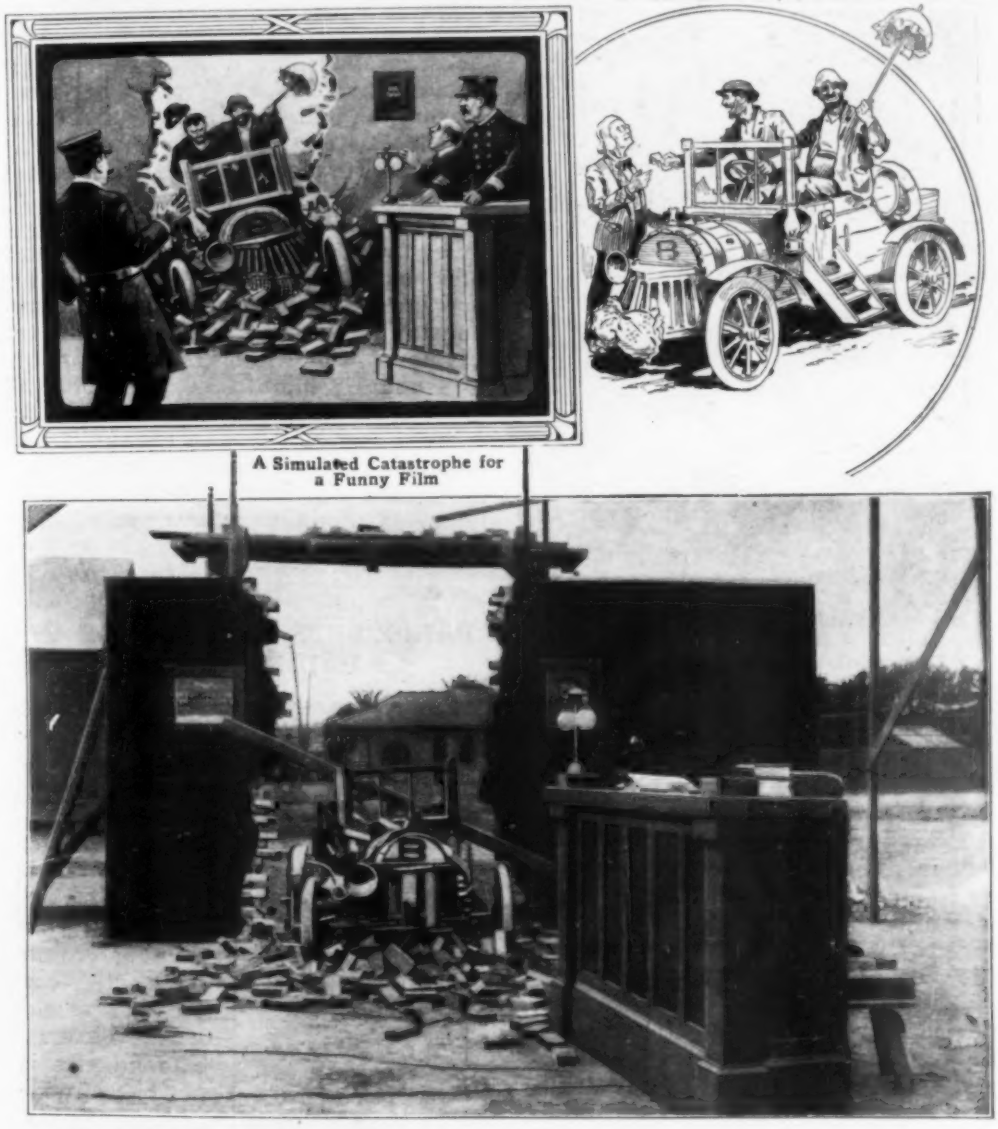
CANOE MADE OF AN EMPTY BARREL

With an empty barrel, a chunk of iron, and a saw, a small boy at an inland resort in Michigan made himself a seaworthy craft to paddle about the lake. A square hole cut in one side turned the inside of the barrel into a roomy cockpit and a heavy weight attached to the bottom kept it from capsizing. A cork life preserver furnished a comfortable seat back. As the passenger's position raised the front end of the barrel almost out of water, the craft was easily propelled and maneuvered with a canoe paddle, as shown in the illustration.

Empty Barrel Converted into a Seaworthy Canoe

AUTOMOBILE SMASH-UP FOR THE "MOVIES"

A moving-picture film depicting in a humorous way the dream of a tramp who built an automobile out of odds and ends, and at last dashed in his car through the wall of a police station, was staged at the racetrack at Santa Monica, Cal., recently. The car's hood was made of barrel staves, the speedometer was an old alarm clock; a trombone provided the warning signal; a window sash formed the windshield, and a lamp, the headlight. The film showed a real station, but this photograph shows that it was only a false brick wall on the field. The bricks were pieces sawed from a pine scantling, and the plaster was sand and flour.



A Simulated Catastrophe for a Funny Film

Photograph Showing How a "Police Station" for a Comedy Film was Set Up in the Open

HOW AN ESKIMO BORES A HOLE

Naturally of a mechanical turn of mind, the Eskimos are excellent workmen with the crude tools they manage to make from odds and ends. They pierce the hard walrus tusks with an ingenious brace and bit which is quite primitive in construction but very effective in practice. A strip of wood is curved like the top of a crutch, and in the convex side a hole is driven to hold a piece of hard wood which constitutes the bit stock. A drill is inserted in one end of this stock, and the curved piece placed against the operator's teeth. A bow-and-string device causes the bit stock to revolve rapidly when the string is drawn back and forth, and a clean hole is drilled in the refractory ivory in short order.

Eskimo Drilling a Piece of a Walrus Tusk

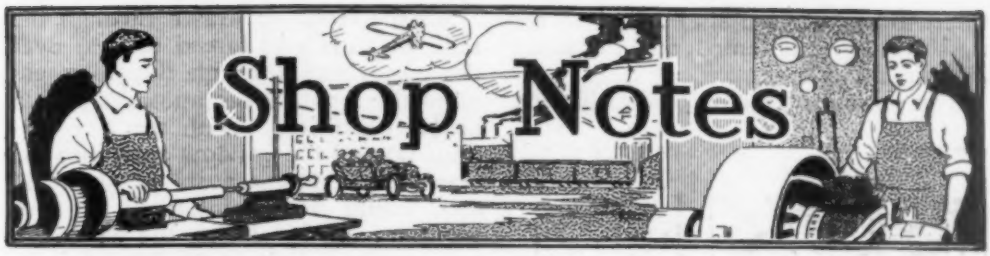
¶A flying boat which fell into the water at Stockholm, Sweden, was brought to land by a submarine which dived under the wreck and raised it out of the water.

SPEED OF ENGLISH RAILWAY TRAINS

Perfect roadbeds have given English railways a solid advantage over their American rivals until a few years ago, and the records made by some of the great trains on the London and North Western, the Midland and the Great Western lines for a long time were standards. The 44¼ miles between Darlington and York are covered by a North Eastern train in 43 minutes, from start to stop, a speed of 61.7 miles an hour. Another quick run is that between Leicester to Nottingham, 22½ miles, which is negotiated in 22 minutes, at a speed from start to stop averaging 61.3 miles an hour. Of long nonstop runs, that from Paddington to Plymouth, 225¾ miles is accomplished in 4 hours 7 minutes, a speed of 54.8 miles an hour being averaged. The London and North Western fast train between Euston and Rhyl, 209½ miles, makes the trip from start to stop in 3 hours 58 minutes, an average of 52.7 miles an hour.

PARIS SETS NEW STYLE IN LADIES' HOSE

Embroidering on their dainty silken hosiery the names of their favored suitors is a new Parisian fashion for young women. The use of light or contrasting colors makes the embellishment conspicuous. The novelty is not one of wide appeal, but the fact that it has been adopted at all may be regarded as a sign of the times.

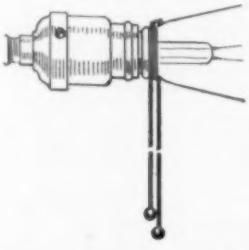


To Find the Cubic Contents of an Irregular Object

Desiring to measure the cubic inches in some rocks, I knew of no way to calculate it, but after some thought I decided to use the following method: A vessel large enough to admit the rocks was procured and filled with water to such a height that the rocks would be covered when they were placed in it. The water level was marked and after putting the rocks in, the level was again marked. I used a square vessel, and the cubic contents was easily obtained by measuring the height to which the water rose and multiplying this dimension with the inside area of the vessel, both expressed in inches.—Contributed by Ernest Range, Johnson City, Tenn.

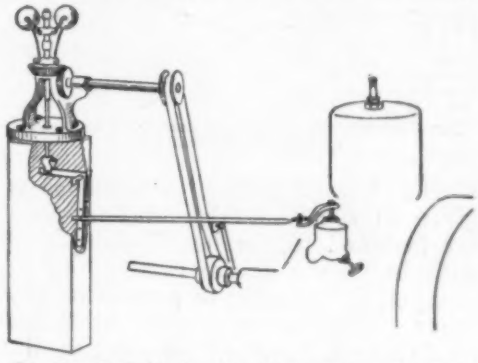
A Simple Electric Pull-Socket Switch

A simple pull-socket switch may be made by tying a strong cord around the base of the electric globe, then screwing the globe into the socket just tight enough to secure a connection. The knot should be at the upper side with one end of the string hanging down on either side. By pulling one end of the string, the globe will be turned outward, thus breaking the connection, while a pull on the other end closes the connection.—Contributed by Paul W. Trier, Maywood, Ill.



Governor Attached to a Marine Gasoline Engine

Desiring to use a marine gasoline engine for stationary work, I found, after installing it, that I had a very uneven power owing to the lack of a governor. To remedy this trouble, I attached an ordinary steam-engine governor, as shown in the illustration. I purchased the governor from a dealer in junk. As the governor did not have a sufficient stroke, I made a bell-crank lever with the vertical arm of sufficient length to secure the desired throw of the rod. The extending rod is connected to the throttle lever on the carburetor. The illustration clearly shows its application.—Contributed by James Hughs, Mexico, N. Y.



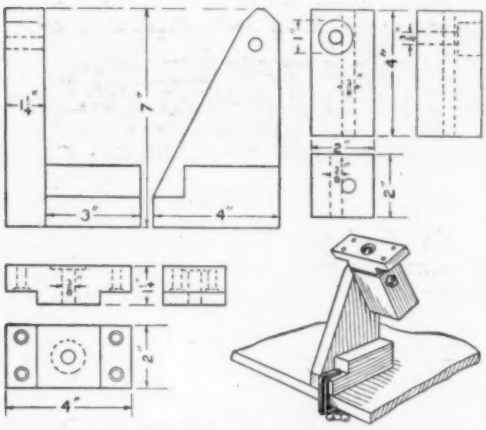
The Speed of the Gasoline Engine is Regulated by the Use of a Steam-Engine Governor

Universal Joint for a Drawing-Board Support

The device illustrated is fastened securely with screws to the center of the back on a drawing board. The construction of the universal joint permits the board to be revolved and

tilted to any desired angle. The materials are easily obtained, and the making not difficult.

The joint and holder consists of four



The Universal Joint Permits the Board to be Set at Any Angle Desired

blocks of wood, having the dimensions given in the drawings. When these are fastened to the board and joined with bolts, the device is ready to be clamped to the edge of a table or any other convenient place.—Contributed by Arthur C. Hetrick, Bucyrus, O.

Heating an Automobile

Working as a chauffeur for a private family and driving a car of the limousine type without front doors, but equipped with complete curtains, I suffered very much from the cold until I constructed a heating device that is very simple to make. The engine pan extended back under the body of the car to the front seat, and all that was necessary to do was to obstruct the heated air passing over the motor and force it up through holes in the footboard. A piece of wire-insert asbestos was procured and fastened to an old shade roller, which was cut the width of the body under the front seat, the curtain part being made long enough to touch the engine pan. A new floor board was made to prevent mutilating the one in the automobile, and 1-in. holes were bored in it, about 3 in. apart, and the heater was complete.

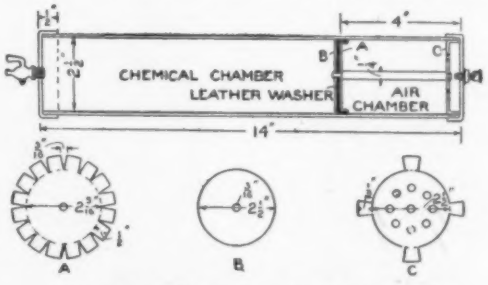
All the fresh air drawn through the radiator thus was forced to pass over the motor and through the holes entered the front of the automobile in a heated condition. With the side curtains up and the window open into the rear part, a temperature of about 45 deg. could be maintained in zero weather; and by closing the window a temperature of about 60 deg. was obtained in the front of the car.

A very fine mesh screen is attached under the floor board, to catch any dust that may be in the air. In moderate weather, the curtain can be rolled up and the automobile will not become too warm. As the exhaust opens up in the rear, there is no trouble with gas fumes. —Contributed by Walter Broeker, Chicago.

A Fire Extinguisher

A simple and effective fire extinguisher may be constructed as follows: A piece of brass tubing, 14 in. long by 2½ in. in diameter, is fitted with a screw cap at each end. One end is drilled and tapped for a petcock and the other for an automobile-tire valve. A cross section of the assembled parts is shown.

The pressure disk, or piston, consists of a cupped leather held in place by a flanged brass plate, A, on one side, and a brass disk, B, on the other, like that used in a bicycle pump but



A Chemical-Filled Tube with Driving Disk and Air-Pressure Compartment for Extinguishing a Fire

larger, with a guide disk, C, fastened to it with a ¼-in. rod, about 3½ in. long.

Fill the chemical chamber with 1 qt.

of carbon tetrachloride and pump up a pressure of about 80 lb. with a tire pump. The extinguisher is now ready for "fire only" and, if well made, will retain pressure indefinitely to throw a 25-ft. stream.—Contributed by H. W. Loweree, New York City.

Gears for Model Work

If a pair of gears of any size with teeth of small pitch are at hand, it is an easy matter to make gears of various sizes for experimental or model work. Procure a strip of light tin of a width suitable for the face of the desired gear, and run it through the gears. This will give the shape of the teeth to the tin.

Bore a shallow hole in a block of wood with a carpenter's expansive bit to the size of the gear wanted, and carefully fit the tin in the circle so that all the teeth will touch the wood.

The Tin is Formed by Running It through Gears, and is Then Used in a Mold to Form the Gears

It will be necessary to make a perfect tooth where the ends of the tin meet. Coat the inside of the tin with soldering flux and pour it full of melted babbitt or babbitt and solder, half and half. If the size of the bore is known, a core of wood can be pointed and driven in the center made by the feeder of the expansive bit. The tin should be weighted to hold it in the mold when the melted metal is poured.—Contributed by Edwin M. Davis, Philadelphia, Pennsylvania.

A Universal-Chuck Plate

The plate shown in the sketch is for use in a universal chuck, to face work against or to prevent the work from pushing back into the chuck. When holding a shaft in the chuck while a cut is being taken, the shaft is apt to work back into the chuck and the center drop from the tailstock. Its principal use is for chucking washers or small pieces having one true surface.

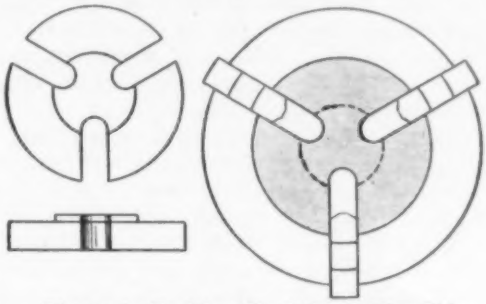
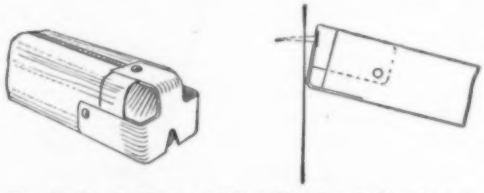


Plate to be Used in a Chuck for Holding Thin Stock to be Faced

The plate is made of a disk, perfectly true on both surfaces and slotted to fit the jaws of the chuck. The slots should be only long enough to allow the jaws to grip the smallest piece to be worked, so that the plate may not be made too weak. The thickness and outside diameter will depend on the kind of work for which it is to be used.—Contributed by L. F. Calhoun, Los Angeles, Cal.

Tack Puller on a Putty-Knife Handle

The putty knife is the only tool carried by painters outside of brushes and is often used for pulling tacks, nails, etc. The blade of a putty knife is too thin for this purpose and is usually damaged beyond repair. It is better to make a tack puller and attach it to the upper end of the knife handle. Such a puller can be easily made from a piece of sheet steel, $\frac{1}{16}$ in. thick, bent to

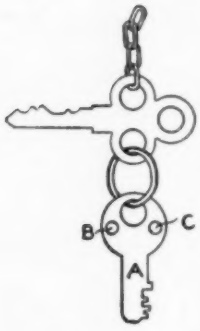


The Puller is Made of Sheet Metal and Attached to the End of the Putty-Knife Handle

shape and fastened on the handle end. The illustration clearly shows the manner of attaching it to the handle and of pulling a tack.—Contributed by J. V. Loeffler, Evansville, Ind.

Singling Out a Key on a Ring

The latchkey on a ring is usually the one most difficult to find, but if it is attached to the ring as shown in the sketch, it will come out, right side up, ready for use.



A chain saves one the annoying experience of reaching home to discover that the keys were left at the office, but for those who do not like a chain, an extra ring may be attached to the important key in place of the chain. It is then easy enough to find the ring among the keys, even in the dark, and on getting hold of it, a slight shake brings the desired key in position for use.

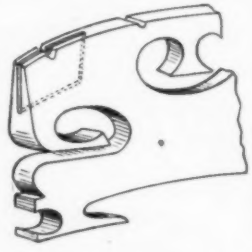
If the head of the key should be of the type shown at A, it will be necessary to drill two holes, C and B, to make the combination work.—Contributed by F. R. Cunningham, Denver, Col.

A Memorandum-Book Holder

The handiest place to carry a memorandum book is in the upper vest or outer coat pocket, but it is easily dropped out when stooping, and thus valuable data may be lost. The method shown in the sketch of insuring against this loss is simple and effective. Most vests have a button sewed at the top of the pocket with a buttonhole in the outer part forming the pocket. Remove the button and sew it on a short length of ¾-in. elastic band, then sew the ends together, thus forming a loop of such diameter as to fit snugly around the book to be carried. After the elastic has been placed around the book, the whole is put in the pocket and buttoned. To release, simply unbutton and withdraw the book and elastic. A buttonhole can be easily made in the outside part of the pocket.—Contributed by Victor Labadie, Dallas, Texas.

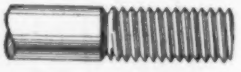
To Prevent Wire Violin Strings from Cutting Bridge

In using a wire E-string on a violin, it soon cuts into the bridge and lowers its position so that the bow hairs will wear on the side of the violin. The gut string causes a great deal of trouble and will not wear long, and the silk string does not produce the right sound. Where it is necessary to use a violin from 5 to 8 hours a day, a wire E-string is almost a necessity. To prevent this string from cutting into the bridge, I insert a piece of ivory into a slit cut with a jewelers' saw in the upper edge of the bridge, as shown by the dotted lines. Such a piece may be put in the entire edge for all four strings, but it is only necessary for the E and A-strings.—Contributed by Roy Douglas, Terre Haute, Ind.



Clearance Groove for Threading Tools

A groove turned in the rod, or shaft, at the termination of the thread will give the tool clearance at the end of the cut. Threads can then be cut without close attention and the breaking of tool points. The groove should be cut no deeper than the depth of the finished thread.—Contributed by J. Harger, Honolulu.



How to Make a Portable Cottage

By FRANK L. RUSSELL

The summer camp that provides a shelter for the toiler during vacation days has become one of a more substantial nature, and the cottage has taken the place of the tent. But the short season a cottage can be used increases the expense of a vacation trip, even though the vacationist owns it, as taxes and interest on the investment amount to no small sum, in fact, equal to quite a large rental. Then, too, a cottage naturally is a permanent affair, and if one desires new scenes and surroundings, it cannot be readily moved. This calls forth a desire to have something better than a tent, more along the cottage line, yet something that can be taken up, stored and easily made ready in a new location, where it can be set on a bit of ground obtained for a few weeks at a nominal sum.

The Cottage as It Appears with the Front Entrance on the Side, Which can be Changed at Will to Any Other Part of the House to Best Suit the Location

Many attempts have been made to construct what is called a portable house, originating from the making of portable garages, but when these were set up they were found to be more of a permanent nature than portable. When the time came for a removal many nails and screws had to be withdrawn, which left the parts in bad condition and sometimes so broken that new ones had to be procured. To avoid all these troubles and to make a really portable house in which the parts are almost entirely interchangeable, the building shown in the illustration was designed. A close examination of the drawings will reveal the fact that the sections, when taken apart, can be laid together flat and crated for shipment. Also, that the door and window sections have the same width and the same joint, so that they can be set in at any place desired, and the building changed from year to year. The manner of construction makes it possible to build a house of two or more rooms, as desired, for as the sections are the same, it only requires a few more of them to add another room. The floor plan, Fig. 1, shows a good size for a three-room cottage.

The description of this portable house being more in detail of the construction of the sections, the stock list in general will be left to the builder. However, in making it of flooring boards, he should remember that these come in thicknesses and widths of 1 by 4 in., and 1 by 6 in., in white pine; and that when finished, they will measure only $\frac{13}{16}$ by $3\frac{1}{4}$ in., and $\frac{13}{16}$ by $5\frac{1}{4}$ in., respectively. Yellow pine can be had in various widths, but taking only the two mentioned sizes into consideration, the builder can estimate how much material he will require and get the price at which the different kinds of lumber are quoted from a local lumber dealer.

Take the first mentioned size, for instance, 1 in. thick and 4 in. wide. This is the basis on which the lumber dealer figures his selling price, so that while one pays for a certain gross amount of board feet, the space this amount will cover must be reduced in accordance with the finished dimensions of the lumber; in this instance to $\frac{13}{16}$ in. in thickness and $3\frac{1}{4}$ in. wide. It is best to figure how many boards will

be required at the finished width, namely 3¼ in., then multiply by the gross width to find the amount of board feet for the cost.

4 and 5, are made in the same general manner as the wall section, Fig. 2. The window consists of an eight-light, 8 by 10-in. glass sash, commonly

Floor Plan of the Cottage as Illustrated, with the Large Living Room in the Center

The sections are designed to take lumber of standard lengths and the cost will not be excessive on this account. The side-wall section, shown in Fig. 2, illustrates the general construction of all the sections for the outside, including the gables, also any partitions. The boards are of matched lumber, preferably of good flooring, fastened to battens, one at the top and bottom, and one in the center, the edges being reinforced with upright battens, which project on one side and recede on the other, 1 in. in width. This forms a lapping joint where the parts are set together. The upper cross batten is fastened with its upper edge 4 in. from the top of the wall boards. This provides a place for a 2 by 4-in. piece—finished size, 1⅝ by 3⅝ in.—to be set on, and makes a depression for the batten on the roof section to be set against when it is hooked. This detail is shown in Fig. 3. The lower batten, Fig. 2, is fastened so that its lower edge will be 1¾ in. above the lower edge of the wall boards. The batten is set on the top of the floor and the ends of the wall boards extend down over the floor boards on the outside.

The window and door sections, Figs. known as storm sash. A frame for the sash is made of ⅞-in. material, with a width equal to the thickness of the wall boards and the battens combined. The sash is hinged at one side and has a catch at the other. This construction permits these sections to be placed between two wall sections, and the glass is in a safe place where it will not be broken in shipment.

The door is set in a frame in the same manner as the sash, except that the bottom cannot be joined. This makes it necessary to crate the door sections with care, to prevent racking of the whole section. The part with the door will lie flat just as the other sections, but the lock will have to be removed.

The gable sections are made like the wall sections except that the battens are put on to fit the slope of the roof. The outline of the positions the battens take is shown in Fig. 6. The dotted lines in the sketch show the positions the wall boards will occupy. The upper batten, on the center section, is set in such a position that it will form a support for the end of a 2 by 4-in. ridge piece. Dimensions for these sections are given in Fig. 7. The notches at the top should be accurately

cut, after the sections are made, so that they will receive the battens that are fastened to the roof boards. Cross lines are shown on the upright battens, at the edges of the wall and gable sections and at the bottoms, with dimensions giving the location of holes for bolts that are used to fasten the sections together. The detail of this construction, with the bolt A, is shown in Fig. 8. These locations should be accurately laid out and ⅜-in. holes bored so that the sections can be used at any place around the building. The end sections are the same as the sides, and the gable boards overlap the walls, as shown by the lower dotted line in Fig. 6.

The roof sections are constructed in the same manner as the walls, the battens being located as shown in Fig. 9. This is the only place where it becomes necessary to depart from the same general width of the sections. All sections in the roof, save two, are 4 ft. wide. Two sections must be 2 ft. wide, so that an extra 1 ft. will be provided for the eave at the gable ends. The narrow widths should be placed in the roof at the center of the building, so that a wider section will come at the end and three-quarters of it will lie on the plate and the ridge, to hold the projecting edge.

The floor sections, Fig. 10, take the same general construction except that all battens run crosswise, and that they are flush with the edges. The number of battens on these sections can be determined by the builder and depends on what is intended to be used as a foundation.

In building up the floor, which is the first thing to set up, it will be found that in placing the corners of the wall boards, as shown in Fig. 11, there will be a space of about ⅞ in. at two side and two end corners. This can be taken

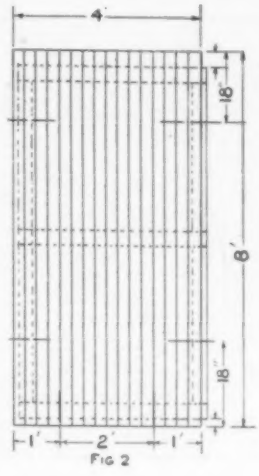


Fig. 2

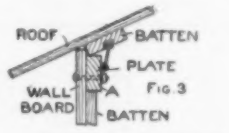


Fig. 3

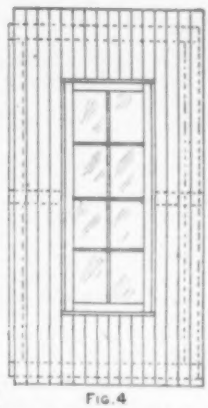


Fig. 4

Solid Wall Section and One with a Window, Both Having Same Outside Dimensions; and the Plate Detail

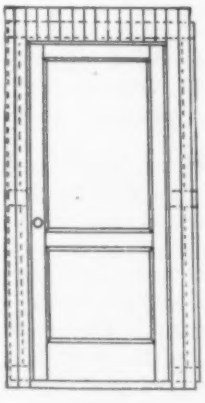


Fig. 5

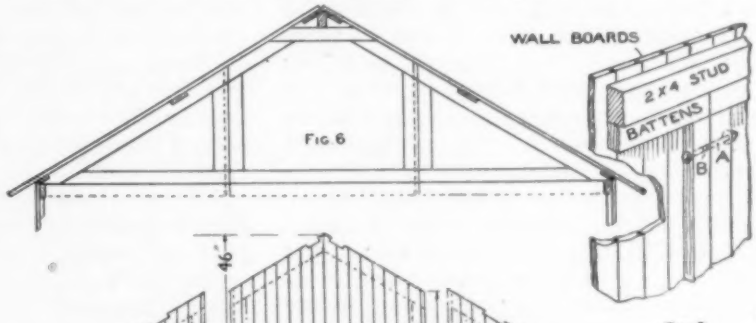


Fig. 8

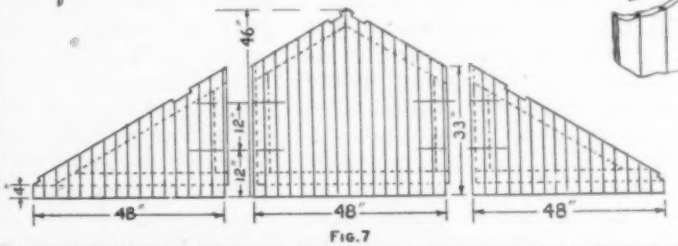


Fig. 7

The Door Section Has the Same Outside Dimensions and Same Construction as the Wall Section, But Those of the Gable are Somewhat Different, the Battens being Cut to Fit the Slope of the Roof and the Boards Fitted to Them in the Same Section Widths

care of by tacking a lath on the sides of the sections, also on the ends of both end floor sections.

A ⅜-in. hole is bored through the upright battens, as shown at B, Fig. 8, so that if a section is placed with its projecting edge at the corner, a bolt can be used to hold the joint and the corner board A, Fig. 12.

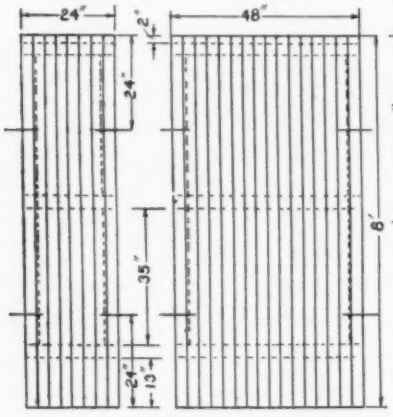


FIG. 9

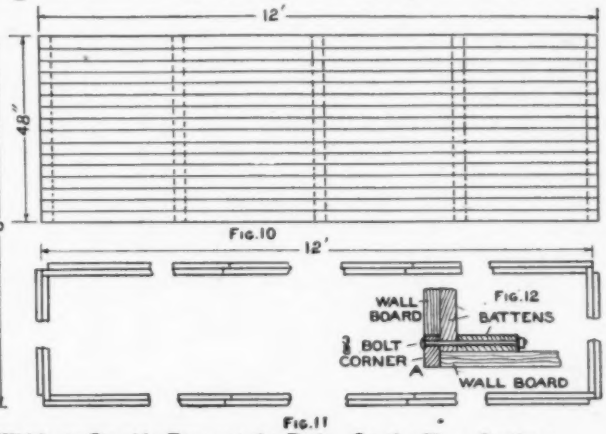


FIG. 11

Two of the Roof Sections are Half-Width, to Provide Eaves at the Ends. On the Floor Sections, Which do Not Lap, the Battens are Flush with the Edges. How the Empty Spaces at the Corners are Filled, and Manner of Joining a Corner

At equal distances apart, on the upper ends of the wall boards, ⅜-in. holes are bored, and holes of the same size are also bored in the plate, or the 2 by 4-in. piece, A, Fig. 3, for bolts to draw them together. These plate pieces should be as long as possible; for instance, for a two-room house that is 20 ft. long, they should be 10 ft. long, two on a side. Those used across the ends should be the length of the width of the house. These plates must fit closely at the corners, one end butting against the side of the other piece running at right angles to it. Where they butt end to end in the center another piece should lap the joint, and longer bolts should be used through the wall boards and plate in the ⅜-in. holes.

Ordinary hooks and eyes are used, in the manner shown in Fig. 3, throughout the construction, and especially for the roof sections in holding them to the ridge and plate. To keep the eyes out of the way for shipment, they should be set in a groove, as shown, or, if possible, in the edge of the batten. The battens across the lower ends of the wall boards are evenly spaced for bolt holes and bored to receive ⅜-in. bolts; and holes are also bored in the ends of the flooring boards to match them. Bolts placed in these holes will hold the wall sections to the floor.

If the cottage is to be set up in the woods, small, straight trees can be cut, dressed and laid on a level place, on which to lay the floor sections. As many poles, or joists, are used as there are battens on the sections, and they are located so that the battens will lie on their upper surfaces. If care is taken in placing the underpinning, the floor will be quite solid. Dressed timbers, 2 by 6 in., or 4-in. square, can be used for joists.

All side-wall boards, roofing and floor boards are fastened to the battens with well-clinched nails, but at a trifle higher cost and by expending a little more time, they can be fastened with screws, which will make a much better and more solid section. The roof sections are covered with prepared roofing of good quality, and after placing them in position, a strip of roofing is fastened over the joints, and a strip lapping over the ridge is also attached.

The partitions are made in the same manner as the wall and gable sections, the only difference being that the extending upright battens and the ends of the battens projecting on one sec-

tion will have to be removed, as well as the 1¾-in. projection of the boards below the lower batten. They will then fit inside of the building at any place. A small notch is cut out of the central gable section to admit the ridge.

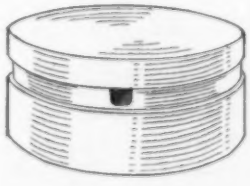
A porch can be attached by using sections for a roof held up by porch columns at the outer edge, and by a 2 by 4-in. piece bolted to the house at the end, or under the eave at the side, as the case may be. This can be determined when the location and manner of setting the window and door sections are laid out. Three roof sections and two floor sections will make a good porch. All sections should be well painted and the floor oiled.

Fireproof Stand for Portable Gas Stoves

To deflect the heat thrown down by a gas stove, I built a low stand, having a sheet of asbestos millboard sandwiched between the wood base and the sheet-metal top. This was secured in place with tacks, fastening the top and passing through the asbestos into the wood base. This device prevents excessive heat on the floor near the stove, and is a safeguard against a possible fire as well.—Contributed by James M. Kane, Doylestown, Pa.

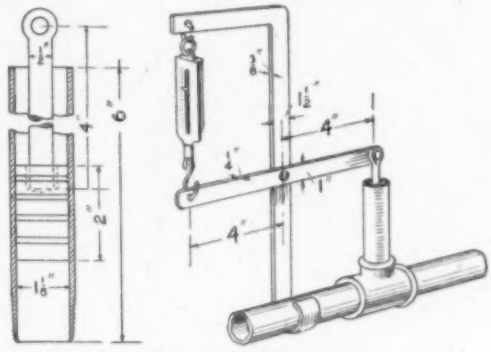
Pill-Dispensing Box

After having considerable difficulty in dropping a certain number of pills from the box into my hand I hit upon the idea of fixing the box as shown, to drop the pills one by one. A notch, the size of a pill, was cut in the edge of the box, then by raising the cover partly one pill at a time could be dropped out.—Contributed by Wm. H. Patten, Belleville, New Jersey.



An Emergency Pressure Gauge

In a case of emergency I used a pressure gauge made as follows: A tee-joint was inserted in the line, and



A Pressure Gauge Applied to a Pipe Line Where a Scale Registers the Pressure

in the side outlet of the tee, a piece of pipe, 1⅛ in. in diameter and 6 in. long, was fitted. This pipe was bored out smooth, and a piston, made of cold-rolled shafting, was fitted in the bore. The piston was about 2 in. long, and several grooves were cut in its surface for packing. The upper end was drilled to receive a ½-in. rod end loosely. The upper end of the rod was shaped into an eye which was attached to a lever, crossing a vertical standard fastened to the pipe. The opposite end of the lever was attached to a spring scale suspended from the right-angle projecting end of the vertical standard.

The inside area of the 1⅛-in. pipe will be so close to 1 sq. in., that the reading on the scale will be direct. To prevent the piston from dropping into the tee, the lower end of the pipe should be turned in a trifle. The dimensions given will make a correct-working gauge.—Contributed by Lee B. Green, Cleveland, O.

¶ In making window screens, put white netting on the outside of the frame and black on the inside; thus the vision of a person inside will not be obstructed while no one on the outside can see through the screens.

A Flywheel Pattern

There are several methods used in the construction of wheel patterns. They differ mainly in the way the

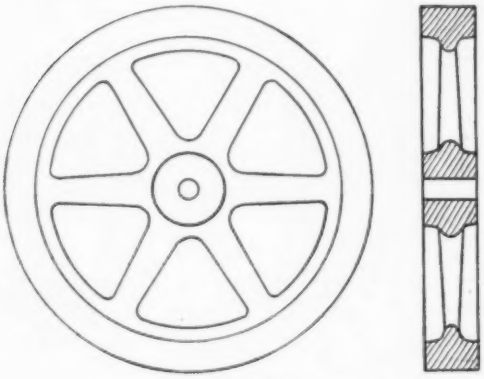


Fig. 1

Design of a 48-In. Flywheel to be Made in a Pattern for the Foundry

arms are fastened together at the hub and in the manner in which they are secured to the rim. The pattern shown in Fig. 1 has stood the test of time and the hard usage of the foundry. A wheel about 48 in. in diameter is shown with arms of the usual elliptic section. The pattern is easily and quickly made in the following manner:

The first thing to be considered is the arms. The stock for these should be planed up to a parallel width and thickness and long enough to extend from the center to a point halfway through the rim. They are then fitted together at the center with the joints running at an angle of 30 deg. to the center line of each piece. These pieces should be fitted on a perfectly smooth surface, or faceplate, to which they are securely fastened with screws. The arms are then laid out and numbered 1, 2, 3, 4, 5, and 6. The arm No. 1 is first removed and cut out on a band saw to the layout lines, and then the taper is laid out and dressed off the flat way of the arm. A flat place, about 1 in. wide, is left on the bottom side of each arm, at the rim end. This is to keep the end from dropping down when the arm is put back into place on the board or faceplate, and the flat surface is trimmed off after the arms are glued together. This part of the work is shown in Fig. 2. Each arm should be completely finished before it is returned to its place. It is much easier to work the oval, or elliptic, section on each arm separately, than it is to try to shape them up after the arms are fastened together permanently. Arms 3 and 5 are then finished and put back where they belong. Those numbered 2, 4, and 6 are next in order, and are glued in place as soon as they are finished.

While the glue is drying on the arms, a suitable faceplate is turned up in the lathe, and the rim built up. If the arms are not too thick, one course of segments will do for the bead that is to be turned on the inside of the rim, but if the arm is thick, like the one illustrated, two courses will be necessary. The rim is built up and turned, as shown in Fig. 3, the joint between courses 1 and 2 being the center of the rim. One-half of the bead is finished in this operation, a template being used to get it the proper shape.

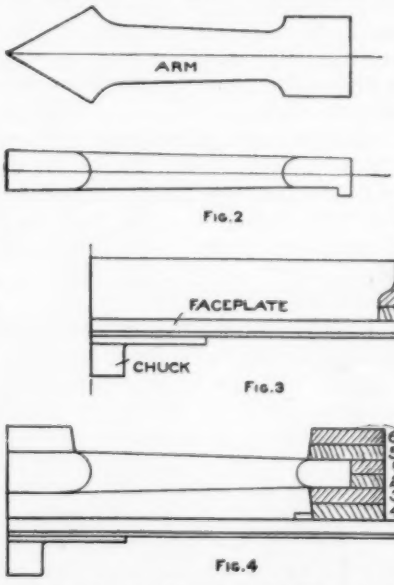


Fig. 2

Fig. 3

Fig. 4

Layout for the Arms, and the Manner of Building Up the Rim Segments

When the rim has reached this stage, it is taken from the faceplate and rechucked on thin segments, which are fastened with brads to the faceplate

and turned to fit the finished side of the arm. The other half of the bead is then finished to the template.

The next operation is to fit the arms to the rim. This is done by cutting recesses through the segment courses 1 and 2, to receive the arm ends. If the job has been carefully laid out and turned, the joint between the segment courses 2 and 3 will be the bottom of these recesses.

The cope hub is a loose one and is turned separately and pinned to the arms, but the nowel hub should be fastened to the arms before the latter are fastened in place in the recesses cut for them in the rim. A screw with glued surfaces, through each arm, secures the hub and gives added strength where it is most needed. The work proceeds as shown in Fig. 4, by applying the courses 5 and 6, and then finishing the inside and outside, and turning the hub to size.—Contributed by J. A. Shelly, Brooklyn, N. Y.

To Prevent Round Stock from Slipping on a Planer Bed

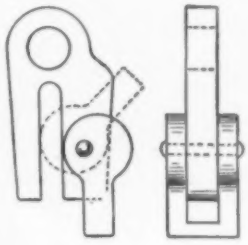
It is frequently necessary to cut a key seat in a long shaft and the work must be done on a planer. There is always a possibility of the shaft sliding along with the tool, even though it is well clamped in one of the slots in the planer bed. A holding device may be had by fastening a lathe dog on the shaft where the dog will rest against the rear end of the table. Of course, if the shaft is short enough, or the key seats so located that a stop can be placed on the front end, it will hold much better.

Sand Bucket for Loosening Dirt

Where a sand bucket is used in digging wells the pounding sometimes packs the dirt or sand instead of loosening it. The dirt may be easily loosened and small stones dislodged more readily if the lower edge of the sand bucket is cut in sawtooth fashion. —Contributed by J. V. Day, Stratton, Nebraska.

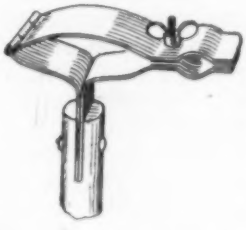
Sheet-Metal Lifting Hook

The illustration shows a hook for lifting and carrying sheet metal in a vertical position. The construction of this hook makes the grip draw tighter as the load increases. The hook can be made in any size to suit the kind of work. The face of the clamping lever can be corrugated or smooth, as desired.—Contributed by Joseph K. Long, Renovo, Pa.



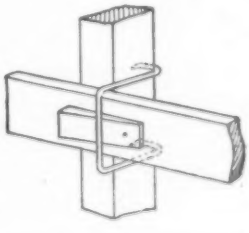
Extension Handle for a Paintbrush

Desiring to use an extension on my paintbrush handle, I quickly made one with the use of an old bicycle-lamp bracket clamp. A discarded broom handle was slotted to receive the shank of the clamp, and a small bolt held it in place. The thumb nut on the bolt of the clamp made it easy to clamp the brush handle in the opening.—Contributed by Elvin L. Hartlett, Wausau, Wis.



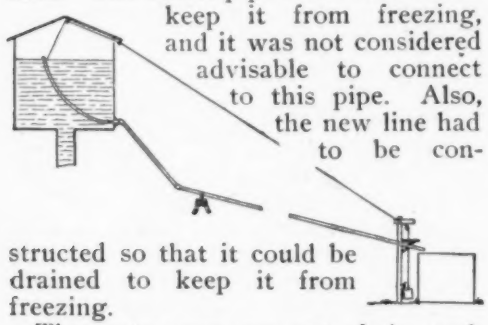
Staging Clamp

The illustration shows a clamp which will save much time and many nails when erecting staging. This clamp is made of ⅝-in. round iron rod. It is applied to the studding, and the board it holds is clamped firmly by driving a wedge between the board and the rod.—Contributed by Abner B. Shaw, N. Dartmouth, Mass.



Temporary Pipe Line Attached to a Tank

A certain piece of work made it necessary to use water temporarily from a tank. The outlet pipe was insulated to keep it from freezing, and it was not considered advisable to connect to this pipe. Also, the new line had to be constructed so that it could be drained to keep it from freezing.



The water was run out of the tank until a man could wade in it with rubber boots, and a hole was cut in the tank near the lower edge and pipe connections made from this point. A long hose was attached to the pipe on the inside of the tank so that its open end could be raised above the water level. A rope was attached to the end of the hose and run over pulleys to a weight near the place where the water was to be used. A shelf was provided for the weight, and when water was wanted, the weight was placed on the shelf. This lowered the hose into the water and started it to run. When the hose was raised out of the water the line drained itself quickly.—Contributed by James E. McCormack, Haliburton, Ontario.

Lighted Box for Tracing Drawings on Heavy Paper

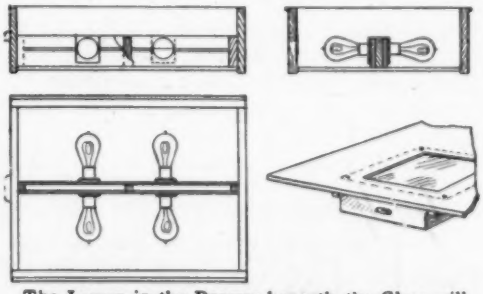
In the drafting room of a railroad office it was necessary to make copies of a large number of tracings on sheets of thick and hard paper. The paper was too thick to trace through in the usual way, and as it would have taken a great deal of time to copy each drawing, the arrangement shown in the sketch was made, to light the drawing from the under side.

An ordinary drawing board was used for the top, and a hole, 22 in. square, was cut in the center. A piece of plate glass, 24 in. square, was procured and the wood of the board cut away to let it in flush with the top. A drawer was then made and fitted to hold four 40-watt tungsten globes, placed horizontally under the glass. The tracing to be copied was placed on the glass and the paper over it. When the current was turned on, the lines to be traced could be easily seen through the heavy paper.

The globes were held in sockets of the ordinary wall type, which were mounted on blocks of wood, the latter being fastened with ¼-in. bolts on two boards, 4 in. wide, which were placed lengthwise through the center of the drawer, as shown. These boards were made with a ¼-in. longitudinal slot extending to within 1 in. of the ends. The bolts of the socket mountings were passed through this slot. With this arrangement the lights can be slipped to any desired position in the drawer and held tightly with the bolts.

The sockets were connected up, and the terminal ends run out through a hole in the bottom of the drawer and attached to a standard plug. The drawer was 8 in. deep, 22 in. wide and 30 in. long, inside measurements. The entire interior was painted with a gloss white.

The device is useful not only for tracing through heavy paper, but also for making tracings of indistinct blueprints, where the white lines would not show through the tracing cloth.—Contributed by J. C. Jacobs, Freeport, Illinois.

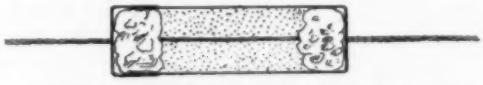


The Lamps in the Drawer beneath the Glass will Light a Drawing on Heavy Paper Sufficiently

Chalking a Line

A line must be coated with dust from a piece of charcoal or chalk before it can be snapped, which alone requires some time when there are many lines to be made. The sketch shows a simple method of making a chalker for a line, which is of great assistance to a scenic artist, but equally applicable to other work.

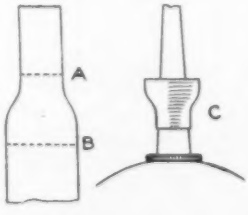
Procure an empty tin box, remove the cover, and punch a hole in its center with a nail; also make a hole in the center of the bottom in the same manner. Run the line through these holes. Place a small moistened sponge in the bottom of the box and fill the box on top of the sponge with lampblack, or any dry, powdered paint, then place another piece of sponge on top and put on the cover. In chalking the line, it is only necessary to run the box the entire length of the line. The sponges will prevent too much color from adhering to the line. As the color has no binder, it is easily brushed off when dry.—Contributed by Mrs. Harry Marcelle, Honolulu, Hawaiian Islands.



The Coloring Powder is Evenly Distributed on the Line by Drawing It through the Box

Drip Catcher on an Oilcan Spout

The drip of an oilcan spout running down on the outside keeps the can covered with grease and in an unclean condition. To catch this drip, I made a cup from a large cartridge shell, cut off on the lines A and B and attached to the spout with solder, as shown at C. A little clean waste or cotton packed in the cup will catch any oil that runs down on the outside of the spout.—Contributed by Chas. G. England, Washington, Pa.



Air-Hose Uncoupling Lever

When uncoupling passenger coaches it is very difficult to disconnect the air hose without a leverage. With the device shown, the proper leverage may be had by placing the prong A under the hose and the prong B above, and bearing down on the handle C. This raises the coupling and loosens the connection. The device is made of ⅝-in. round iron.—Contributed by Benjamin H. Baird, New York City.

Lever to Use in Disconnecting the Air Hose When Uncoupling Railroad Passenger Coaches

Lace-Hole Marker for Belts

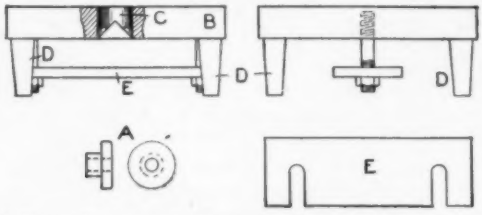
A very practical tool for laying off holes to be punched for wire lacing in belts is shown in the illustration. The tool is made of hard wood, 1½ in. thick, 4 in. wide and 6 in. long. A row of wire nails or brads, spaced ⅜ in. apart, are driven part way into the end and lined up evenly, whereupon the heads are filed off and the ends pointed. Finish the block to make a handle, as shown. I find this simple tool very rapid and accurate in scribing holes for punching.—Contributed by John M. Pipp, Muncie, Ind.

To Lengthen a Twist Drill

Sometimes when drilling a hole in a difficult piece of work, it is found that the drill is just a little too short. The drill can be easily extended to cut through the metal by wrapping the shank with a layer of fine emery cloth or several layers of paper before inserting it into the taper hole.—Contributed by John A. Cook, Birmingham, Alabama.

A Drill Jig

A simple drill jig that will locate holes centrally in a shaft, or other round stock, accurately and quickly is shown in the sketch. It may be provided with any number of hardened and ground slip bushings, A, to take various sizes of drills and reamers.



A Jig to Use on a Drill Press for Drilling Holes in Round Stock Centrally

The body B is a gray-iron casting with a 90-deg. angle groove machined the full length of it. A permanent bushing, C, is hardened, ground and located exactly in the center of the groove. The result of the work depends on the accuracy of the location of this bushing. The legs D are made of cold-rolled steel and pressed into holes drilled in the corners of the plate.

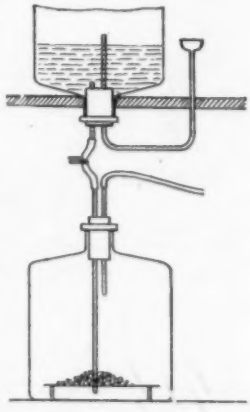
The clamp E should be slotted, as shown, for rapid work. A small pin may be located close to the lower edge of the bushing C, to prevent the slip bushings A from turning while in use. A slot is made in the bushing A to accommodate the pin.—Contributed by A. Dane, Pottstown, Pa.

How to Make a Hydrogen Generator

The hydrogen-gas generators used in establishments where a great deal of lead burning is being done, such as storage-battery plants, usually consist of two wooden boxes, one being mounted about 3 ft. above the other. The lower box is made air-tight, but it is connected to an opening in the bottom of the upper box by means of a piece of rubber tubing which is provided with a stopcock or pinch valve, and the upper box is usually partly open. These boxes are both lined with some material, such as lead or rubber paint, that is not acted upon by the sulphuric acid used in the production of the hydrogen gas. The operation of the device is as follows:

A small quantity of commercial zinc is placed in the lower box through an air-tight opening provided for this purpose, and the upper box is partly filled with sulphuric acid diluted with about 10 volumes of water. When the valve in the tube connecting the two boxes is opened, the acid runs down into the lower box and a reaction takes place, the result of which is zinc sulphate and hydrogen gas. If the outlet from the lower box is closed, a pressure will be established, due to the hydrogen gas, which will force the excess acid back into the upper box—the tube into the lower box should extend inside and the end almost touch the bottom—and reduce or stop the chemical action of the acid on the zinc. As the gas is drawn from the lower box the acid is allowed to run down and again start the chemical reaction.

The arrangement shown in the sketch operates in the same manner, and its construction is a great deal less troublesome. Instead of two boxes, use two 5-gal. water bottles. One bottle should be supported in an inverted position at least 3 ft. above the other. Each bottle should be provided with a large rubber stopper with two openings in them, through which small glass tubes may be inserted. The proper length and arrangement of these tubes is shown in the sketch. The inside end of the air inlet in the upper bottle should extend up to within a very short distance of the bottom of the bottle; while the acid inlet into the lower bot-



tle should almost touch the bottom. The remaining two tubes should extend just inside the corks. A pinch cock should be provided in the tube conducting the acid from the upper bottle to the lower. Some kind of a small, light support should be made from thin lead and placed on the bottom of the lower bottle, to hold the zinc above any acid that cannot be forced back up into the upper bottle.

Be very careful to get all the air out of the lower bottle before any attempt is made to light the gas, as an explosion is sure to follow if any air remains.

The gas thus generated may be used in many ways, but especially in producing a pure, hot flame. For this purpose a burner is required, which may be purchased at most chemical houses, and a foot bellows to supply air pressure. The air pressure can be produced by using a large can and connecting it to the water faucet; when the water is turned on, the air is forced out.

Trapping Killies

While out catching crabs one day, we ran short of meat and could get no other bait than killies, but had no net. Having an empty milk bottle in our lunch box, it was tied to a line so that it would hang in a horizontal position. A piece of meat was weighted and placed near the bottom end. The bottle was then hung over the side of the boat. The killies would enter the neck and nibble the meat and thus attract others, and as a result we caught plenty to bait the crabs.—Contributed by Robert Meier, Lynbrook, L. I.

Binding Bales of Hay on a Wagon

In hauling baled hay on rough roads, the bales can be bound together to keep them from slipping off with wood pins, about 4 in. long, sharpened on both ends and stuck into a bale about halfway before placing another bale on top of it.—Contributed by Ray C. Evans, Meyers Cave, Virginia.

Bed Desk for an Invalid

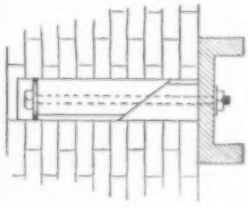
An adjustable desk or table for an invalid or convalescent can be made as shown in the sketch. The arrangement

The Desk can be Attached to the Bed and Adjusted to a Comfortable Position

of the top may be in this or any other manner to suit the maker. The length of the desk should be the same as the width of the bed. Two vertical standards made of two pieces of tubing, one telescoping in the other, are used as the supports. Clamps are attached to the upper ends of the larger, or outside, tubes for use in holding the desk at the height set. A brace, also made of two telescoping tubes, is used at each end to adjust the rear part of the desk to a comfortable height for the user. Thumb nuts are used to clamp the desk to the bed.—Contributed by Louis Stankewitz, New York City.

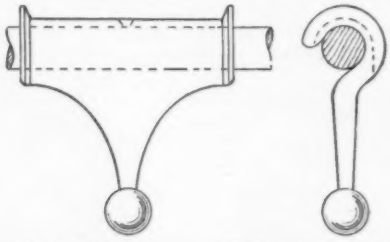
Homemade Expansion Bolts

When expansion bolts are not available, substitutes can be made of pieces of gas pipe of the required size, each cut slanting with a hacksaw to divide it into two pieces, as shown. A bolt is passed through the center and a large washer holds the bolt head. When drawn up, the sloping parts clamp on the sides of the hole.—Contributed by James E. Noble, Toronto, Canada.



Belt Holder for a Shaft

The unused belt, when there is no loose pulley to shift it on, is usually hung on the running shaft or attached

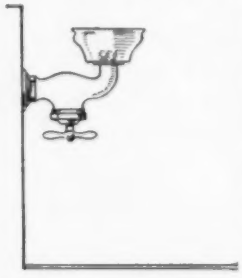


The Holder Swings on the Shaft and is Ready to Carry the Belt When Not in Use

to a wire fastened to the ceiling or joist. A much better way is to make a belt hanger, as shown in the sketch, to hold the belt. It consists of a piece of wrought iron, forged out as shown, to fit over the shaft and an extending end to prevent its turning with the shaft. An oil hole is provided to keep the bearing well lubricated. When a belt is hung on this holder there is no danger of its catching on the shaft and being wound up and broken.—Contributed by S. Gulbransen, Chicago.

Sanitary Drinking Fountain for a Shop

Wishing to install some sanitary drinking fountains as cheaply as possible, I struck on a very good idea which proved both satisfactory in every respect and strictly sanitary. There were three large wash sinks in the shop, and each was fitted with three plain bibbs and one hose bibb. I merely turned the hose bibb around, allowing the hose end to face upward. I then secured three vitreous-china drinking cups which fitted snugly over the hose end and then, by screwing a locknut on the top, the cups were held secure. Each fountain head had four small holes to allow the water to drain and was so constructed as to make it impossible for the lips to come in contact with the bibb, thus making the device just as sanitary as any drinking fountain on the market.—Contributed by D. Marcus, Madisonville, Ohio.



Combination Lathe or Planer Tool

The lathe or planer tool illustrated is one that holds cutters made of self-hardening steel, ¼ by ⅜ in. These cutters will stand more rough usage and take heavier cuts than a like sectional volume, ½ by 1½ in. in size, used on combination tool holders. A wedge instead of a setscrew is used for holding the cutters. The wedge has more bearing on a cutter than a screw and it will not break. If there is any wear, the wedge will take it up.

A Combination Tool Holder Using a Wedge Instead of a Screw for Clamping the Cutter

For cutting-off tools, place two pieces, ⅛ by ¾ in., side by side in the holder, allowing the one ground for the cutter to project farthest from the holder.—Contributed by Fred B. Stoner, Masontown, Pa.

Removing Tarnish from Silver by Electricity

There is no solvent for silver sulphide, or tarnish on silverware, that is not a better solvent for the silver itself. Therefore the tarnish cannot be removed in a solution. However, this coating can be removed electrically. Make a dilute acid solution, 1 part chemically pure sulphuric acid to 10 parts of water, and use a carbon electrode. The tarnish will disappear in a few minutes without injury to the silver.

In the absence of a battery, suspend the silverware in the solution and bring a piece of aluminum in contact with it. This will restore the luster.

Proper Construction of Fireplaces

By E. C. KNOPF

After a generation of wood and coal stoves, the open fireplace with its glowing wood fire is again coming into its own, this time taking a permanent place in the home life of those who realize the comfort and enjoyment it lends to a living room or den.

There is a distinct charm about a crackling fire in an open grate, possessed by no other feature of our grandfathers' home life. Colonial furniture, china or architecture are out of place in modern city and suburban life, but the glowing fire of the hearth awakens a spirit that mere age or style of material cannot conjure up. This is nowhere more forcefully seen than in the thousands of homes whose elaborate heating systems, to combat the severe cold of northern winters, are supplemented by the open-grate fire to add cheer to the home. Nor is it out of place among the most modern house furnishings. But the greatest demand for these gloom chasers is in those mild-winter regions where it is desired to heat only one or two rooms.

It has been found, however, that along with some other things which the pioneers did, such as building log houses, the construction of fireplaces which will give satisfactory heating service has become a lost art. Modern masons, with their training based on the demands of modern methods of heating, are not to be censured for their lack of knowledge along this line, any more than the carpenters who do not know how to build a log house.

Out of the large number of fireplaces I have examined, only one—and that one in a mountain camp—was found which possessed the correct principles of construction. In a suburb of a western city, having a district covering a half square mile, 14 fireplaces were found and not one of them was giving satisfaction. Either the smoke came into the room with the heat or both went up the flue together, or it took too much fuel to get the required heat. As a consequence some of these were closed and stoves installed. If it were not for these disadvantages, there would be three fireplaces to every one now in use.

Having for many years made a study of the principles of fireplace construction, I submit the following plans which have been found to give entire satisfaction. Built on these lines, a fireplace will heat as well as a stove, with the same amount of fuel, and no smoke will enter the room. There are many ways which might be illustrated as the wrong method, but the two most frequently found are shown in Figs. 1 and 2. A cross section of one in which the draft carries all the heat up the flue is shown in Fig. 1. The smoke from the front wood strikes the broad, flat arch A, and some of it goes out into the room. In the one shown in Fig. 2 the heat as well as the smoke will pass up the flue.

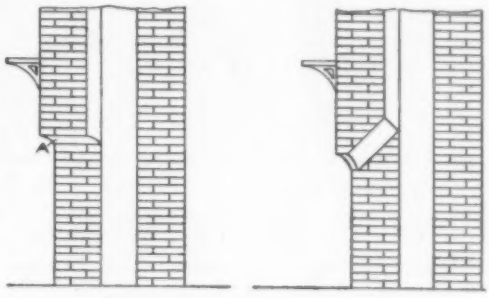


FIG. 1 FIG. 2

The Most Common Faults of Fireplace Construction Wherein the Heat and Smoke cannot be Controlled

A properly constructed fireplace is shown in cross section in Fig. 3. The throat is long and narrow, being gradually shortened as it widens into the flue, as shown by the dotted lines in Fig. 4. For the average-sized fire box, the width of the throat A, Fig. 3, should be about 3 in. at the narrowest part, where the point of the shoulder B comes nearest the apron C. The apron should extend at least 6 in. below the point of the shoulder, so as to catch the smoke. In a large fire box, in which

the apron is 5 ft. or more above the hearth, this drop of apron should be at least 1 ft. It may be of arch form, but should not be over 2 or 3 in. thick up to the turn in the throat. Beyond this point it gradually thickens, and the

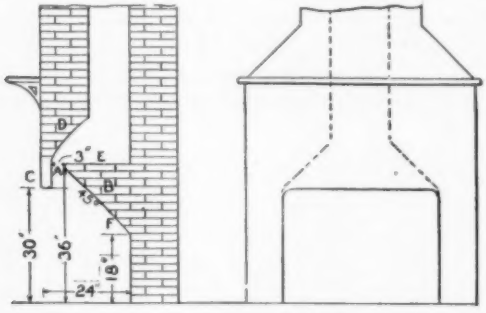


FIG. 3 FIG. 4

Fireplace Construction Where the Heat Enters the Room and the Smoke Goes Up the Chimney

thick wall D, just above the apron, should be built strong enough to support the section of chimney above it. The shelf E is left flat, to stop any down drafts of air from gusty winds. The principle of construction is based on the fact that heat, acting quicker than smoke, strikes the inclined surface F and is deflected into the room while the smoke traveling slower goes up the flue.

The inclined surface, F, of the shoulder, which carries the smoke and heat toward the apron, whether built on a curve or a straight line, should be at an angle of 40 to 45 deg. from the perpendicular. For a fire box 3 ft. wide, the height from the hearth to the apron should be at least 2½ ft. with a 6-in. apron, and the depth should be 2 ft., from the front of the apron to the back of the fire box.

The walls of the throat and flue should be as smooth as possible. If rough stone or broken brick are used, they should be plastered to make a smooth surface. The chimney should extend at least 2 ft. above the ridge of the roof, to insure against down draft in the flue.

¶As the weather gets warmer and the automobile bearings run hot, use thick oil, greases and graphite.

Wax Phonograph Records Used for Insulation

When sealing up some windings, such as magnets, resistance coils, etc., and not having a sufficient quantity of wax or paraffin for the purpose, I made use of a few broken wax phonograph records. I was much surprised at the properties of this wax. In the first place it was very hard compared with paraffin and had a rather high melting point, so that it would not soften and bend as paraffin, that is, it could not be made as flexible. I used this wax in constructing and repairing electrical instruments by coating the outer windings of the magnets, coils, etc., and then shaving down the wax. This looked exactly like hard rubber and had the advantage of being firmly fastened to the wire. I also used it in repairing broken magnet covers, filling the spots chipped out with the wax, with the result that it would take a close examination to detect the repair. Similarly it was used as insulation in constructing a 1-in. coil, and, although I could not test its dielectric properties, I have had no trouble from leakage.

This wax may be used for innumerable other purposes, as it can be melted and the article soaked in it, but it also can be handled in a more convenient manner, similar to soldering, by melting it with a piece of hot iron and applying it where needed, whereupon it is finished with a file and sandpaper, or turned in a lathe.

The wax can be obtained from any dealer in phonographs, especially those keeping record exchanges. Be sure to get the wax records, not the indestructible ones made of vulcanized composition, as these will not melt. Various colors may be had, but black resembles hard rubber and gives a better appearance. The final finish may be done by polishing with a little benzine on a rag. —Contributed by Arthur Worischek, New York City.

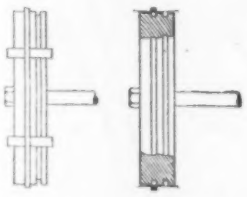
¶A pneumatic or rubber tire placed on a buoy will prevent it from marring the hull of a boat.

Cutting Glass Disks

The small shop, not equipped with a circular glass cutter, can cut disks for steam and pressure gauges in the following manner: Fasten a wood disk to the faceplate of the lathe, the disk having a diameter larger than the glass to be cut. Apply a thin coat of glue to both the surface of the wood and of the glass. Place a piece of paper on the glued surface of the glass and then apply both to the glued surface of the wood disk. Rotate the lathe spindle by hand and at the same time hold a common glass cutter on the glass at such distance from the center as to make a disk of the proper size. The glass disk can be removed easily before the glue has time to harden.—Contributed by Arthur Hoem, Butte, Mont.

Placing Steam-Engine Piston Rings

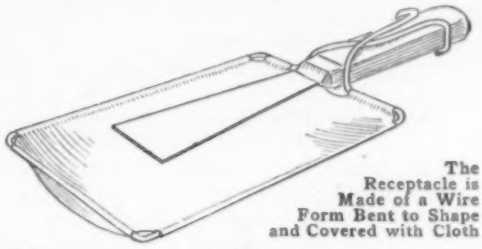
It is sometimes necessary to put packing rings on a solid head without disconnecting the piston from the crosshead to get the rear rings in place. The rear ring must be sprung over the head and slipped over the first ring groove. It is almost impossible to keep the ring from getting into the first groove and sometimes a number of rings are broken before this is accomplished. The sketch shows how some small pieces of sheet iron can be put under the ring to keep it from dropping into the first groove. The ring can then be easily pushed over the strips of iron to its place in the rear groove.—Contributed by F. W. Bently, Milwaukee, Wis.



¶When a small pipe connection or a petcock becomes so worn or loose that it leaks, never try to remedy it by soldering the joint, but tin the entire length of the threads, and the wear will be taken up.

Refuse Holder on a Scraping Knife

When scraping calcimine from a ceiling, the dust, scraps, etc., may be prevented from falling to the floor by using a receptacle shaped like the one

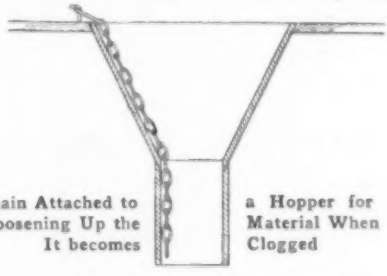


The Receptacle is Made of a Wire Form Bent to Shape and Covered with Cloth

shown in the sketch. The receptacle is made of a wire, about ⅛ in. in diameter, bent in the shape shown. A piece of cloth or canvas is then fastened to the wire frame. When necessary the knife can be released and the contents of the receptacle removed.—Contributed by Chas. J. La Prella, Flushing, L. I.

Cleaning a Clogged Hopper

Any substance like coal or concrete, in passing through a hopper, is liable to clog the narrow portion and prevent any of the material from passing until it is cleaned out. A very good plan to prevent the clogging is to attach a chain at the upper rim of the hopper and allow it to hang on the inside. If the hopper becomes clogged,



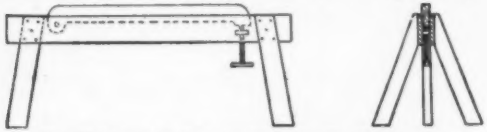
Chain Attached to Loosening Up the It becomes a Hopper for Material When Clogged

pull on the chain slightly and it will start the material.—Contributed by G. Goodwin, Jr., Ottawa, Can.

¶A scale filed on a bit, beginning at the cutter end, will save the trouble of pulling out the bit every few turns to see if the hole is deep enough.

An Adjustable Balancing Trestle

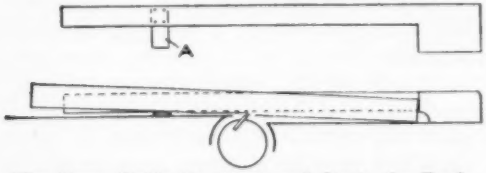
The trestle has three legs so that it can be set on any surface, no matter how uneven it may be. The top horizontal piece is provided with a metal bar, hinged at one end and having an adjusting screw at the other. A spirit level is attached to the bar. A pair of these trestles will enable one to do rapid work, as the leveling surfaces can be quickly set level.—Contributed by John E. Elwing, McCleary, Wis.



The Horizontal Bar on the Trestle Crosspiece can be Easily and Quickly Set Level

Tapering Wood on a Jointer

Many attempts have been made to cut tapers on a jointer, but as the knives cut too deep at the point where the taper starts, a poor job results, says a correspondent of the Wood-Worker.



The Form Holds the Work and Starts the Feed, Preventing the Knives from Cutting Too Deep

A form made as shown in the sketch, with a piece of zinc, A, attached will start the feed right and produce nice work.

To Make a Lusterless Finish on Paint

If it is desired to paint a surface with oil paint and yet have it a lusterless finish, apply a coat of skimmed milk or strained buttermilk over the dry oil paint, or a very thin coat of laundry starch, cooked, which should also be stippled. The advantage is twofold, as it allows the use of oil paint, is easier to apply than flat or turpentine paint, and the protective flat coating can be washed off when it becomes soiled with dust or smoke, leaving the clean oil paint intact, over which another coating of milk or starch can be applied. This is done very often where soft coal is burned. In this way the oil paint may be preserved indefinitely, barring accidents.

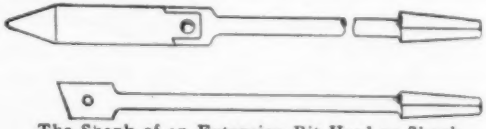
Holding Pipe Threads in a Lathe Dog

In cutting pipe threads in a lathe I could not grip the pipe with a dog without damage to the threads, so I made a little holder to overcome the difficulty. A pipe coupling was procured and cut to fit in the dog, then a ¼-in. slot was cut in one side, as shown, and the opposite side filed down thin to allow it to spring slightly. The holder is turned on the threads of the pipe and then the lathe dog is clamped over it.—Contributed by John P. Kolar, Ithaca, N. Y.

The Coupling Turned on the Pipe Threads Protects Them from the Setscrew of the Lathe Dog

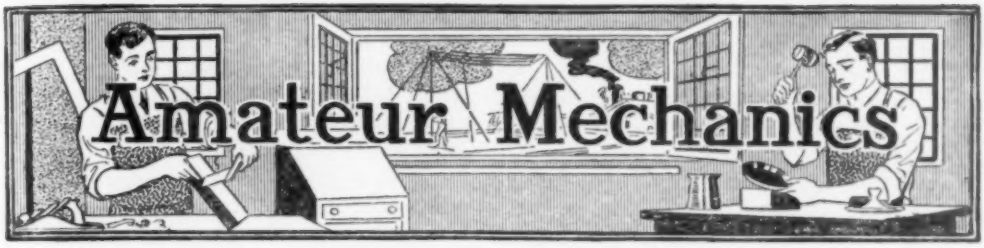
Shank for a Soldering Iron

The sketch shows how I made a very serviceable soldering iron from a discarded extension-bit shank. A large piece of copper was drawn to a point on one end, and the other end was shaped to fit the shank of the extension bit. A large rivet served to hold the parts together. The square end of the shank was flattened to receive a wood handle.—Contributed by George M. Crawley, Jr., Newark, N. J.



The Shank of an Extension Bit Used as Shank for a Soldering Iron

¶In scouring steel cutlery, use a large cork instead of a cloth; it will wear longer and give better results.



A Power Windmill

The windmill shown is somewhat different from the ordinary kind. It is not a toy, nor does it approach in size the ordinary farm windmill, but is a compromise between the two, and in a good strong wind, will supply power enough to run a washing machine, a small dynamo, an emery wheel, or any other device used in the home workshop. The wheel is about 5 ft. in diameter, with eight blades. The over-all length is about 6 feet.

The windmill is easily made and the cost is within the means of the average boy. There is not a part used in its construction that cannot be found about an ordinary manual-training shop. The most difficult parts of the construction will be described in detail. Symmetry and smoothness of design should be preserved and the parts made as light as possible consistent with strength and durability.

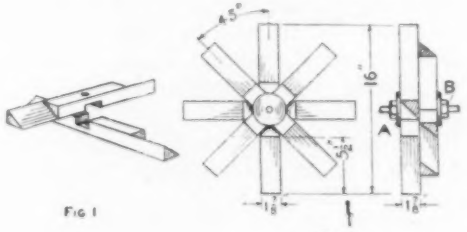


FIG. 1 FIG. 2

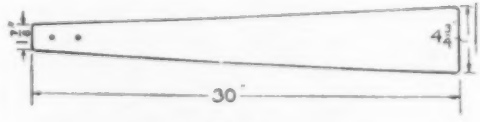


FIG. 3

The Hub Consists of Two Parts, Each Having Four Arms for Holding the Blades

The Wheel

As shown in the drawings, the wheel has eight blades. Ordinarily the use of eight blades makes it difficult to construct a hub of sufficient strength to carry them. Where so many blades radiate from a common center it is almost impossible to provide an anchorage for each blade. To provide a maximum of strength coupled with simplicity of design, the plan of using two hubs of four arms each was adopted in the construction of this mill. The ordinary hub of four arms is simple to make and quite strong. Four pieces of straight-grained oak, each 16 in. long and 1⅞ in. square, are used in constructing the hubs. The manner of notching each pair of pieces together is shown in Fig. 1. The slope for the blades is made to run in opposite directions on the ends of each crosspiece. The slope is formed

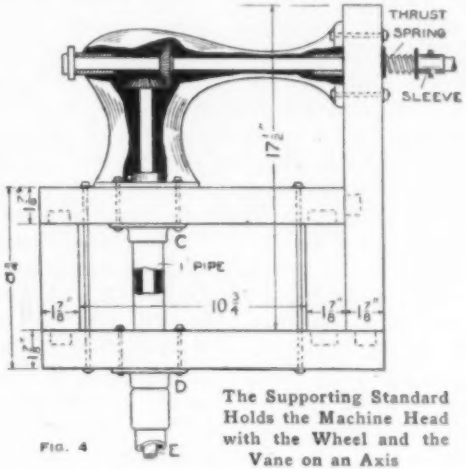


FIG. 4

The Supporting Standard Holds the Machine Head with the Wheel and the Vane on an Axis

by cutting out a triangular piece, as shown.

The two hubs, thus formed, are mounted on the shaft, one behind the other, in such positions that the arms will be evenly divided for space in the wheel circle. These details are shown in Fig. 2. The blades, Fig. 3, are made of thin basswood or hard maple, and each is fastened in its place by means of two ⅜-in. bolts, in addition to which a few brads are driven in to prevent the thin blades from warping.

The Gears

This windmill was designed to transmit power by means of shafts and gear wheels, rather than with cranks and reciprocating pump rods, such as are used on ordinary farm mills. To obtain this result, an old sewing machine head was used. Such a part can be obtained from a junk dealer or a sewing-machine agent. The head is stripped of its base plate with the shuttle gearing; likewise the needle rod, presser foot, etc., are taken from the front end of the head along with the faceplate. The horizontal shaft and gear wheel are taken out and the bearings reamed out for a ½-in. shaft, which is substituted. The shaft should be 2 ft. in length, and 8 or 10 in. of its outer end threaded for the clamping nuts which hold the two hubs in place, as shown at A and B, Fig. 2. The gear wheel is also bored out and remounted on the new shaft.

The supporting standard is constructed of oak, with mortise-and-tenon joints, as shown in Fig. 4. The width of the pieces will depend on the kind of sewing-machine head used. It may be necessary also to slightly change the dimensions. The machine head is fastened on the support with bolts. A sleeve and thrust spring are mounted on the shaft, as shown. The sleeve is made of brass tubing, of a size to fit snugly on the shaft. A cotter will keep it in place. The sleeve serves as a collar for the thrust spring, which is placed between the sleeve and the standard. This arrangement acts as a buffer to take up the end thrust on the shaft caused by the varying pressure of the wind on the wheel.

The Vane

To keep the wheel facing the wind at all times, a vane must be provided. It is made of basswood or hard maple, as shown in Fig. 5. It is not built up solid, air spaces being left between the slats to reduce the wind resistance. Unless built in this manner, the vane is liable to twist off in a gale. The horizontal slats are ¼ in. thick, and the upright and cross braces ⅜ in. thick, while the long arm connecting the vane to the supporting standard is ½ in. thick.

The supporting standard, carrying the wheel and the vane, must revolve about a vertical axis with the changes in the wind, and this vertical axis is supplied in the form of a piece of gas pipe which runs through the supporting standard at the points marked C and D, Fig. 4. Ordinary pipe fittings, called flanges, are bolted to the frame at these points. The coupling in the gas pipe beneath the supporting standard serves as a stationary collar to support the weight of the whole mill. The vane should be placed correctly to balance the weight of the wheel.

The shaft passes through the framework of the mill on the inside of the pipe, as shown at E. A ⅜-in. soft-steel or wrought-iron rod is satisfactory for the shaft, as no weight is supported by it and only a twisting force is transmitted. The use of a larger rod makes the mill cumbersome and unwieldy. The upper end of the shaft is fastened to the shaft that projects from the under side of the machine head by means of a sleeve made of a piece of ⅜-in. pipe. Two cotters hold the shafts and sleeve together.

At the lower end of the shaft, inside the workshop, the device shown in Fig. 6 is installed. The purpose of this appliance is to provide a horizontal shaft upon which pulleys or driving gears may be mounted. The device is constructed of another sewing-machine head similar to the one already described. The head is cut in two and the separate parts mounted

on suitable supports. The gap between the sawed portions permits a pulley to be fastened on the shaft to serve as the main drive. The wheel propelled by the treadle of the sewing machine will make a good drive wheel. The small handwheel, originally mounted on the machine-head shaft, is left intact. This arrangement gives two sizes of drive wheels. Heavy sewing-machine belts will serve to transmit the power.

The Tower

The tower can be built up in any manner to suit the conditions. Ordinarily sticks, 2 in. square, are suitable. These are well braced with wire and fastened securely to the roof of the shop. The arrangement of the tower with the mill is shown in Fig. 7.

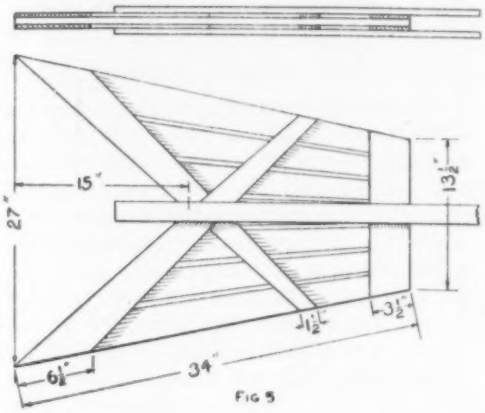


FIG 5

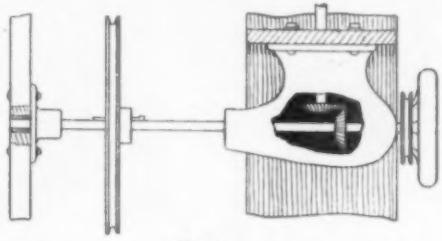
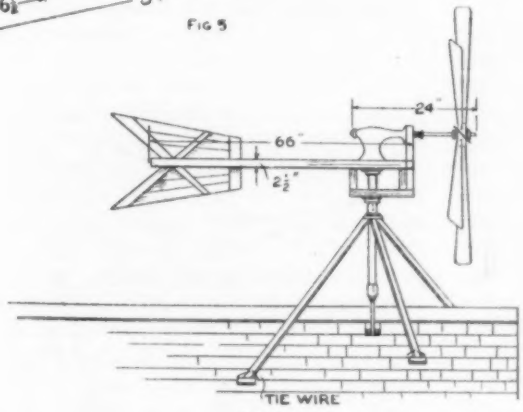


FIG 6

The Lower End of the Shaft has a Horizontal Shaft Geared to It for the Drive Pulleys. The Vane Construction and the Manner of Building the Tower on Which the Supporting Standard Revolves



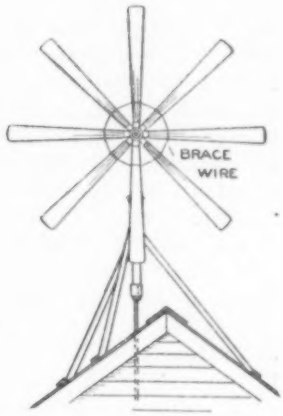


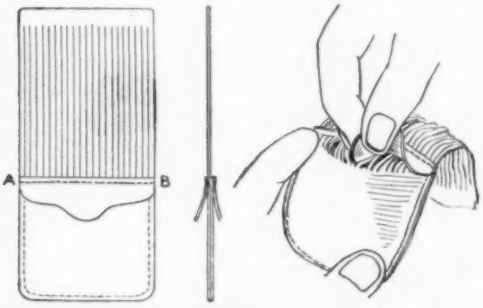
FIG 7

Telegraph Code on Typewriter Keys

A very simple and practical method of transcribing wireless time and other messages on the typewriter without having such perfect knowledge of the Morse system as to be able to immediately translate it into the common alphabet is the following: The characters of the Morse system are inscribed on small slips of paper—thus, three dots (. . .), for the letter S; two dashes (- -), for the letter M, etc.—and these slips are pasted on the corresponding keys of the typewriter. The operator puts on his receiver, and the proper key is struck as he hears the corresponding Morse letter. As there are no capitals, spacing between words, or even punctuation, the manipulation of the typewriter is much simplified, and it is easily learned to record the signals as fast as they are heard.

A Puzzle Purse

The puzzle purse is made of four pieces of chamois, two of the pieces being merely flaps, one on each side at the upper edge. One of the pieces



The Strips of Leather Sliding through the Stitches Make the Puzzle Part of the Purse

forming one side of the purse extends upward for about twice the height of the purse part. The part above the purse has a number of slits cut in it to make the width of each strip ⅛ in. These slits should be accurately cut in order that the purse may be opened easily. The other half is only the size of the purse proper. The upper edge of the latter piece and the flap on that side are stitched together to the flap on the opposite side, the threads of the stitches running between the strips of the long piece. These stitches are made on the line AB and around the edge.

To open the purse, take hold of each side on the purse part and draw the pieces apart. In doing so, the strips are drawn through the stitches so that they may be separated and a coin taken from the purse. A pull on each end will close the purse.—Contributed by Chas. Motton, Toronto, Ont.

An Emergency Sandpapering Machine

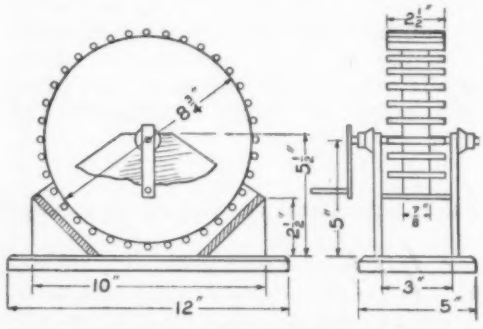
While doing some work I had several small pieces to be finished with sandpaper. They were so small and of such a shape that it was impossible to do the work by hand. Not having a sanding machine, I used a disk talking machine for the purpose. I placed a sheet of sandpaper over the disk and fastened it to the felt at the corners with pins. The machine was then set going at its highest rate of speed, and the articles were smoothed by holding them on the disk.—Contributed by Fred S. Barnard, Los Angeles, Cal.

A Developing Machine

The base of the developing machine consists of a wood tray with sloping ends and high sides, which is placed at the center and provides bearings for the wheel axle. The dimensions given in the sketch are for making a machine to develop a film about 29 in. long. The disk, or wheel, is cut from a board, ⅞ in. thick, and the attached crosspieces are cut from ¼-in. dowels to make them 2½ in. long. These are placed about 1 in. apart on the circumference of the disk.

An axle, fastened solidly in the wheel and adjusted in the bearings, is kept from slipping sideways by bushings made of a spool. A crank is attached to one end of the axle. Hot paraffin is applied to the inside of the tank part, to make it liquid-tight. Two pins or hooks are attached to one of the crosspieces to catch into the film end. If the wheel is the correct size, the same pins can be used for fastening the other end of the film.

The film is first attached to the



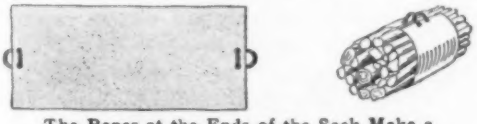
The Entire Length of Film is Placed on the Wheel Where It is Run through the Developer

wheel; then, while turning slowly, the developer is poured into the tray. Keep on turning the wheel until full development is obtained, then pour out the liquid and turn in fresh, clear

water, and turn the wheel to wash out the developer. Remove the film and place it in the hypo bath.—Contributed by Raymond M. Bealer, Baltimore, Md.

A Stove-Wood Carrier

A handy wood carrier, for bringing wood and kindling from the basement or yard to the wood box in the house, may be made from a grain sack, as shown in the sketch. Use a complete sack and make rope handles at each end. When used, place only sufficient wood or kindling in it to permit the handles to come together over the top of the load. This will make a comfortable grip and it is no harder to carry than a medium-weight suitcase. When the wood is removed the carrier can be taken to the back yard and

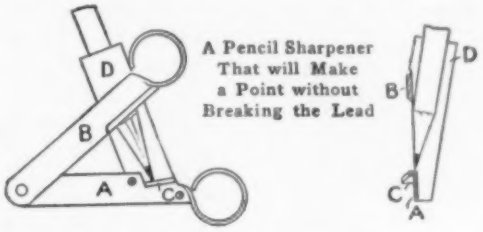


The Ropes at the Ends of the Sack Make a Handle to Carry It Like a Grip

shaken out, thus doing away with the dirt that usually results from other methods of filling wood boxes.—Contributed by Walter Nelson Kidston, Seattle, Wash.

A Pencil Sharpener

A pencil sharpened with the device shown will have a better point and one that will not break easily while being sharpened. The lower arm A is made from a strip of sheet steel, $\frac{1}{16}$ in. thick. An extension, $\frac{1}{4}$ in. wide, is cut and bent in a circle to form the lower finger hold. The upper arm B forms the cutter, which is made from a piece of hacksaw blade. The teeth are ground off and the temper is drawn from the extension that forms the upper circle. A portion of the arm A is bent over, as shown at C, to form a support for the pencil point to rest upon. A hole, large enough for a pencil to turn in, is bored through a stick of hardwood, D, and tapered so that the center of the hole meets the inner edge of C. It is fastened to the lower arm with screws. A sharp cutting edge is ground



on the blade which is then attached to the arm A with a rivet loosely enough to swing freely.—Contributed by J. V. Loeffler, Evansville, Ind.

Cleaning an Oilstone

Use kerosene oil and a sprinkling of emery flour and proceed to sharpen tools. It is not necessary to clean a stone thus treated before placing the tool on it, as the emery and kerosene will make a good surface on the stone as well as assisting in producing a sharp edge on the tool.—Contributed by James M. Kane, Doylestown, Pa.

Landing for Small Boats

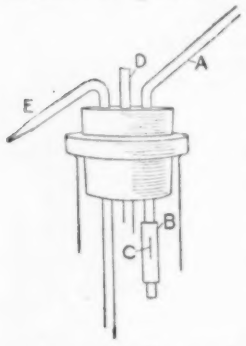
Not having a landing for my small boat, I made a series of sectional platforms, rising 2 ft. above the bottom, which served the purpose well and were inexpensive. Each section is about 15 ft. long, 3 ft. wide, and 2 ft. high. The frame is made of material 2 in. thick and 4 in. wide, and on top is a floor made of boards, while the bottom consists of 2 by 4-in. crosspieces, nailed on 6 in. apart. Stones are laid on these crosspieces to moor it down in place. The whole landing is simple to make and it lasts a long

The Series of Platforms Make a Good Small-Boat Landing on a Slanting Beach

time, as the sections can be drawn out and stored during the winter.—Contributed by Henry Briggs, Lexington, Massachusetts.

Wash Bottle for Laboratory Use

A large-mouth bottle neck is provided with a stopper, having three brass or glass tubes as shown, the tube A being fitted with a thick piece of rubber tubing, B, stoppered at its lower end. A slit is cut at C, and allows the air blown in through the tube A to pass into the bottle, but will close automatically and hold the pressure within the bottle.



If the relief tube D is closed with the thumb the water is forced out in a steady stream through the nozzle E. The water will continue to run for some time after the lips are removed from the air tube, but the removal of the thumb from the tube D will stop the flow of water instantly.—Contributed by W. Schilling, San Francisco, Cal.

Typewriting on Card Stock

Anyone having tried to typewrite on cards or heavy stock has doubtless experienced much trouble in getting the card to feed properly. If at all heavy, it will resist the curving so strongly that it will not be carried around the platen, and the edge of the card is very apt to catch on the pressure rolls and cause the platen to slip.

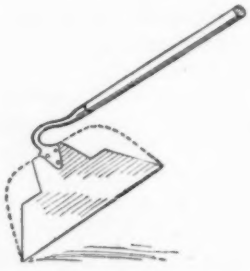
The remedy is very simple and consists in running a sheet of paper through ahead of the card until an edge of about ½ in. remains, then inserting the edge of the card inside of the projecting edge of the paper and turning the platen. The paper overlapping the card prevents the edge of the latter from catching on the pressure rolls and keeps it in close contact with the platen so that it will pass through without trouble.—Contributed by Thos. L. Parker, St. Paul, Minn.

A Furniture Polish

A homemade furniture polish that will compare with any known polish, is composed of the following chemicals and oils. Mix 3 oz. of turpentine very gradually with 6 oz. of linseed oil, then add 3 oz. of grain alcohol, 3 oz. of 5-per-cent acetic acid, and ½ oz. of butter of antimony. Apply with a cloth and use a good friction. As the substance might prove harmful to children if taken internally, see that it is kept out of their reach.—Contributed by Loren Ward, Des Moines, Iowa.

Pointed End on a Hoe

The rounding end on the ordinary hoe is useless in many instances for getting under growing plants, to cut out the weeds and to loosen up the earth. I find that shaping the hoe ends as shown in the sketch is very effective in getting up close to a plant and under spreading vines.—Contributed by R. F. Pohle, E Lynn, Mass.



Starting a Siphon

Roll up a soft rubber hose tightly so that it will be flattened to force out all the air and drop one end into the liquid, then let the coil unwind as it falls down on the outside. The uncoiling causes a slight vacuum in the hose and the liquid follows it up and starts the flow instantly.—Contributed by L. J. Monahan, Oshkosh, Wis.

¶Paint spots on window glass can be readily removed with a penny.

Electrical Heating Apparatus for the Home

By ARTHUR MOORE

PART III—An Electric Foot Warmer

The construction of the foot warmer here described is very simple; the materials required are easily obtained, and if proper care is exercised in carrying out the instructions, excellent results will be obtained in the operation of the completed device. The foot warmer consists of two main parts: the containing case and the heating element, and the construction of each will be treated separately.

The containing case should be made of a fairly heavy piece of Russian iron, similar to that used in stovepipe but about three times as thick, if a piece of such thickness can be procured. For a case to correspond with Fig. 1, the outside dimensions of this piece should be at least 18 by 17 inches.

Draw two lines, A and B, on the piece of iron parallel with the 18-in. dimension, 3¾ in. and 4¾ in. from the two edges, respectively, and two other lines, C and D, parallel with the 17-in. dimension, both 3 in. from the edges. The rectangle formed by these four lines will be the top of the case. On each side of this rectangle lay out two figures identical in shape and dimensions with those shown, also lay out the two parts above and below the rectangle. All the projections marked E should be bent down along the dotted lines at right angles to the surfaces from which they project. These projections are to be used in fastening the case together. Bend the main projecting pieces, at the right and left of the rectangle, down along the dotted lines C and D, until they are at right angles to the surface of the rectangle. These pieces will form the ends of the case, and the upper and lower projections from the rectangle are bent around the curved ends to form the sides. They are fastened in place by means of small rivets or stove bolts that pass through holes in the lugs on the end pieces and holes in the side pieces. The side pieces should be just a little larger than the horizontal dimension of the rectangle so that they project perhaps $\frac{1}{16}$ in. beyond the surface of the end pieces, thus giving

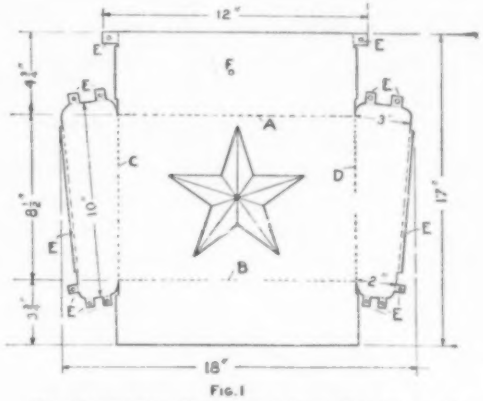


FIG. 1

The Containing Case is Cut from One Piece of Russian Iron and Bent into Shape

a much better construction and presenting a better appearance.

Considerable care should be exercised in handling the sheet of metal to see that it is not bent out of shape or dented. In bending down the lugs and other projections, it would, no doubt, be best to securely clamp the metal between two surfaces with straight edges, such as two boards of hard wood, so that the angle formed will be as near perfectly square as possible.

This case is to contain the heating element, and in order that the heat generated in it may readily pass out of the case, it will be necessary to drill numerous holes in the top portion. These holes may be made in any promiscuous manner, but the appearance will be greatly improved if they are laid out according to some definite design. It is not advisable to drill too many holes, as this would weaken the case and perhaps cause trouble later. A suitable design for the center

in the form of a star is shown, and other designs may be added as desired.

A hole, F, is drilled in the case, as shown, for the conductor leading from the source of energy to the heating

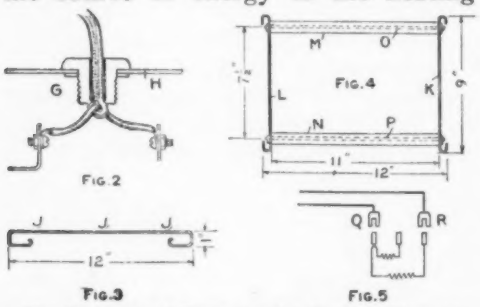


FIG. 2 FIG. 4 FIG. 3 FIG. 5

The Support and Parts for the Heating Element and the Electrical Connections

element. The diameter of this hole should be large enough to take a porcelain bushing with an opening in it of sufficient size for the duplex conductor. The porcelain bushing, which is shown in Fig. 2, is held in place by a copper nut, G, screwed onto the bushing inside of the metal case H.

On account of the temperature of the heater, it will be necessary to support it on suitable legs so that it will not damage the surface upon which it may be resting. These legs can be made from a piece of strap iron, ⅛ in. thick and ¾ in. wide, and should have a form and dimensions similar to those shown in Fig. 3. Three holes, J, large enough to take a small stove bolt, are drilled in each piece.

The under side of the containing case is closed by means of a piece of sheet metal, 12 in. long, and wide enough to extend about 1 in. over the edge of each side piece. This piece may be fastened in place by the same bolts that hold the legs, and holes should be drilled through it and through the side pieces to correspond to the holes in the pieces forming the legs. The holes in the case should be smaller and threaded, so the stove bolts can be screwed into them from the inside and will not fall back into the case when the legs and piece of metal are being fastened in place.

The heating element is constructed as follows: The frame upon which the resistance wire is to be wound is shown in Fig. 4. It consists of two pieces of strap iron, K and L, ⅛ in. thick and ⅝ in. wide, of the dimensions and form shown, and two porcelain tubes, M and N, mounted upon two rods, O and P, that connect the pieces K and L. The outside diameter of the porcelain tubes should be at least ½ in., and the length of the frame should be such that it will just slip into the containing case. Two holes are drilled in each end of the containing case to correspond to those in the ends of the pieces K and L. These holes are drilled in such a position that the upper surface of the heating element is parallel with the top of the containing case and about 1 in. beneath it.

A thin sheet of asbestos is wound around each porcelain tube, about two turns, and fastened in place by means of some temporary wires until the resistance wire is in place. The edges of the sheets of asbestos should be on the outside of each tube.

Procure about 60 ft. of No. 24 gauge "advance" resistance wire and proceed to wind it on the frame as follows: Take a turn around one tube, about ¼ in. from its end, and tie the wire by twisting the end of the wire around the main portion so that about 2 in. of the end is free to make a connection. Wind the wire around the tube, spacing the turns about ⅛ in. apart. This spacing may have to be changed in order that the wire be properly distributed, but this can be determined after a few turns are in place. The winding should terminate at the opposite end of the tube upon which it started and about 2 in. of free wire be left to make a connection.

A piece of No. 14 gauge asbestos-insulated copper wire, about 10 in. long, is fastened to each end of the resistance wire by means of two very small bolts and washers.

The cord leading to the heater is put through the porcelain bushing, and a knot tied in it, so as to take care of the strain, as shown in Fig. 2. The ends of this cord are then fastened

by small bolts to the pieces of copper wire leading to the heating element. These joints should all be insulated with asbestos sleeving. A heavy sheet of asbestos is placed inside the containing case, so that it will be between the heating element and the bottom of the case. The legs and bottom are then fastened in place.

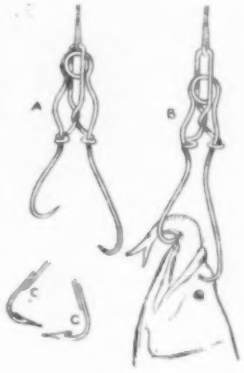
With the arrangement of the heating element described, the heat generated cannot be varied. An arrangement of heating elements, similar to that shown in Fig. 5, makes it possible to obtain three degrees of heat. Either resistance may be used alone or the two in series. If it is desired to arrange the heater according to the scheme shown, two heating elements, either separately or on the same frame, must be constructed. The resistance of one of these elements should be one-half that of the other. If it is desired that the input to the heater, when connected for the maximum heat, should be about 330 watts, the resistance of the lower element should be about 33 ohms, when operated on a 110-volt circuit, and it should be capable of carrying 3 amperes. If the resistance of the other element is made 66 ohms, its input, on a 110-volt circuit, when connected alone, will be 165 watts. By connecting these two elements in series, the combined resistance will be 99 ohms and the input will be 123 watts. The current-carrying capacity of the 66-ohm element should be 1.5 amperes.

Three plugs may be mounted at some convenient place on the containing case and the heating elements connected to them as shown in Fig. 5. These plugs must all be insulated from the containing case with an insulation that is not affected by the heat. Two clips, Q and R, are then attached to the supply circuit, and the combinations of resistances described above can be obtained by various connections of the clips and plugs. These clips and plugs are easily constructed, or may be purchased from almost any electrical supply house.

The cord used in connecting the heater should be of a better grade than the ordinary lamp cord, and should have a much heavier insulation and larger copper conductors.

An Automatic Fishhook

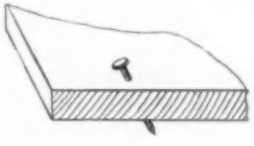
The hook A is made of tempered brass or steel wire of a gauge sufficient for the size of the fish to be caught. A wire of No. 18 gauge is about right for ordinary fishing, with a No. 20 or 22 gauge for the trigger. Hooks, C C, can be soldered on the points to angle for larger fish. Barbs are not required for smaller fish.



Such a hook will catch the fish, even if they only nibble, and is especially good for fishing through the ice. Use a bob and a pole, and bait the short hook with a minnow or worm. The extreme length of a hook for catching a 1-lb. fish should be 3 in. Fasten the line as shown at B.—Contributed by Robert C. Knox, Waycross, Ga.

Driving Nails to Prevent Splitting

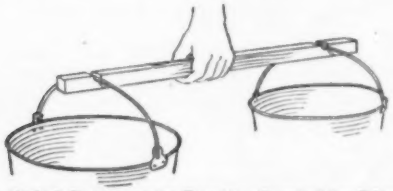
A nail driven so that it crosses the grain, as shown in the sketch, is not likely to split the board through which it passes. The splitting often results when the nail is driven straight. The nail should be started at different angles according to the grain of the wood.—Contributed by Chas. G. England, Washington, Pa.



¶A razorlike edge can be put on a knife blade by carefully stropping it without lubricant on a piece of smooth aluminum after first whetting on an oilstone.

Carrying Two Pails in One Hand

When it is necessary to carry two small filled pails in one hand and a package in the other it will be found a



Two Filled Pails can be Readily Carried by Placing the Bails on the Ends of a Stick

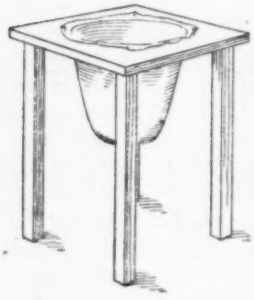
very difficult job, if the contents are liquid. Procure a stick of sufficient size to carry the weight of the pails and cut a small notch in each end to admit the bail. Place a pail on each end of the stick and take hold in the center, or, if the pails are not equally filled, a little to one side of the center.

Preserving Paint in Open Cans

To keep paint from drying out in an open can it is necessary to exclude the air from the oil. This can be done by procuring an air-tight paper sack, which is tested by blowing into it. Set the can into the sack and tie it tightly with a cord. Mixed paint will be kept in a working state in this manner.

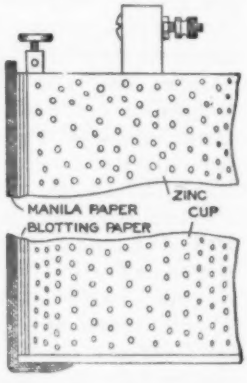
Jelly-Straining Stand

Procure a board, 7/8 in. thick and 18 in. square, and cut a hole, about 1 ft. in diameter, in the center. Fasten posts, 4 ft. long, to each corner. Screw hooks are located around the edge of the hole to catch into the cloth used for holding the fruit. The stand is high enough to be convenient and admit a vessel beneath to catch the juice.



Renewing Dry Batteries

It is a well-known fact that dry cells commence to deteriorate from the time they are manufactured, and it is a matter of considerable uncertainty in purchasing cells to know whether they will continue to be efficient for their supposed natural life under the existing conditions of service, or for only a small part of this period. When the voltage of a dry cell falls below a certain value it is usually discarded and replaced by a new one, which often means quite an expense. The following simple suggestion will enable one to renew the prematurely exhausted cell with very little trouble and slight expense, so that its period of usefulness will be extended for a length of time, at least equal to that for which it could be used if put into service immediately after its manufacture.



The procedure in renewing the cell is as follows: A casing is placed outside of the zinc-containing case, having inside dimensions a little greater than the zinc cup. The space between the zinc cup and case is filled with a dry electrolyte, which, upon the addition of moisture, sets up a chemical action with the exterior surface of the zinc, and the latter having been perforated, causes electrical action to be again produced.

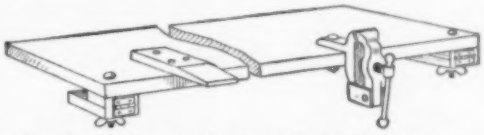
The casing, or cup, to be used outside the zinc cup should be made of a waterproof material. The electrolyte instead of being placed between this cup and the zinc in a powdered form, as might be expected, should be held by several layers of blotting paper, formed into a cylinder of the proper diameter to fit snugly on the outside of the zinc cup. This porous cup should be impregnated with a solution containing the following materials in the approxi-

mate amounts given: Muriate of ammonia, 10 parts; bichromate of potash, 4 parts, and chloride of sodium, 4 parts. After the porous cup has thoroughly soaked in the above solution it should be dried by passing a roller over its external surface when it is mounted on a wooden cylinder of proper diameter. The moisture-proof cup may be formed outside the porous cup by covering the latter with several coats of waterproofing paste and winding on several thicknesses of common manila paper, each layer of paper being treated with the paste. A disk of cardboard, properly treated, should be placed in the end of the cylinder to form the bottom, and the edge of the manila paper folded in over it and pasted in place.

The pasteboard covering surrounding the zinc cup of the cell should be removed and the surface of the zinc thoroughly cleaned. The coal tar in the top of the zinc cup should be removed by tapping around the edge with a hammer, and a large number of small holes should be made in the walls of the cup with a sharp instrument. Then put the cell within the porous cup and fill the top with clear water, preferably rain water. A chemical reaction will immediately take place between the outer surface of the zinc and the chemicals contained in the material forming the porous cup, and the terminal voltage of the cell will be practically the same as it was when the cell was new. The water, of course, must be replenished from time to time on account of evaporation, and the useful life of the cell can be prolonged for a considerable time. A part cross section of a cell treated as described above is shown in the accompanying sketch.

Workbench Equipment for a Table Top

The average home mechanic with a few tools seldom has a place to work and is usually without a workbench. As this was my case, I constructed a bench equipment that I could easily clamp to the kitchen or other table and thus have the necessary tools at hand for work. A plank, 2 in. thick, 10 in. wide and 18 in. long, was planed and



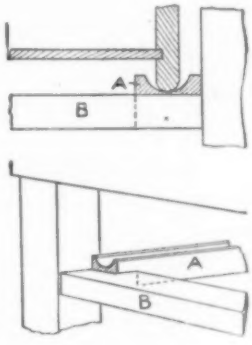
The Bench Top can be Quickly Attached to Any Table Top without Harming It

smoothed up on all sides, and a vise and a bench pin were fastened on one edge.

To the under side of the same edge two blocks were securely fastened, as shown, and to these blocks two other pieces were fastened with hinges. With a bolt, running through from the top, and a thumb nut used underneath, these pieces are used as clamps for holding the bench to the table top. The top can be removed and set away in a closet when not in use.—Contributed by Wm. H. Hathaway, Nutley, N. J.

A Nonsticking Drawer Guide

The guide shown is nonbinding and has been found thoroughly practical after several years' use on furniture. The guide A consists of a piece of wood, about 1⅛ in. square, with a concave cut in its upper edge, the width being about ¾ in. and the depth such as not to cut through the extending end projecting over the crossbar B.



The drawer sides have a half-round edge on the bottom edge to run in the groove in the guide. The difference in width between the groove in the guide and the rounding edge on the drawer side causes the drawer always to ride snugly without binding as the wood expands or contracts with changes in the weather.—Contributed by Herman Hermann, Portland, Ind.

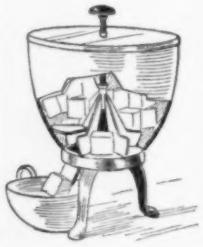


FIG. 1

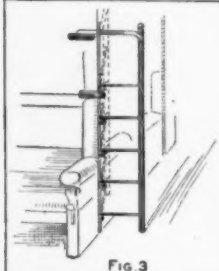


FIG. 3

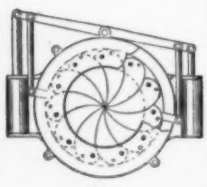


FIG. 5

FIG. 7

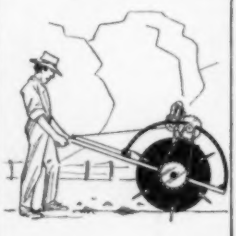


FIG. 9

INTERESTING NEW PATENTS

SUGAR-DISTRIBUTING BOWL (Fig. 1)—When the vertical shaft in the center is turned the sugar block is dropped into the hand or into the tea or coffee cup through the aperture in the bottom of the bowl. The lower part of the shaft carries a number of sloping partitions at the bottom, which divide the space into small compartments. Each of these compartments has an opening at its outer edge large enough to admit one block. When the compartment is over the aperture, this opening is closed by a stationary cover supported on the side of the bowl.

NOVEL PROPELLER FOR ROWBOAT (Fig. 2)—In this device paddles are carried at the ends of two shafts which work independently of each other, each being supported on the gunwale and a pillow post at the center of the boat. The paddles are cup-shaped and are attached to the ends of rods which slide in openings in the paddle head, the paddles dropping out of the way when in the high position and falling to engage the water when in the low position.

FOLDING LADDER FOR SLEEPING-CAR BERTHS (Fig. 3)—With this device a Pullman-car passenger is enabled to get into or out of the upper berth without waiting for the porter to bring the ladder. It consists of a series of steps which are pivoted to the berth partition and to a vertical support that rests on the floor when in use. When not in use, the whole device is folded compactly against the berth partition.

GRASS SHEARS (Fig. 4; British patent)—These grass shears are apparently designed for cutting in corners, around trees and shrubbery, and in other places where the use of a lawn mower is difficult. The double-edged cutting blade is pivoted to work closely over the fixed toothed blade and is operated by a swinging bar.

DIMMER FOR AUTOMOBILE HEADLIGHT (Fig. 5.)—Spiral plates pivoted to the outer flange of the case are arranged to overlap each other in such a way that, when swung inward, they partly or wholly close the front of the case, as desired. When the case is entirely closed, the only light emitted is that which passes through the slots in the plates. The device is operated by a circular wire pivoted to all the plates.

DEVICE FOR HOLDING DOOR IN OPEN POSITION (Fig. 6; British patent)—This device consists simply of an arm rigidly attached to the door or other hinged object and provided with notches along its outer surface, used in connection with a spring bolt, supported on the door casing and arranged to engage the notches of the arm.

TONGS FOR EXTRACTING FRUIT SEEDS (Fig. 7)—The ends of the tongs are provided with cutters which are easily forced into the fruit. The seed is grasped and held in a depression in one of the arms, being forced into this depression by the pressure of the opposite arm.

GAS TURBINE (Fig. 8; British patent)—An explosive mixture of gas and air is introduced into each pocket in succession through the large inlet at the top of the casing, and is fired when the pocket reaches the electric spark plug at the left. The explosion reacts at an angle against the side of the casing and causes the rotor to revolve. The products of explosion escape when the pocket reaches the outlet at the right.

REVOLVING PLOW (Fig. 9)—This is a novel attempt to use a motor in the work of plowing. The motor is mounted at the top of the arched frame and drives the cutting wheel by means of a chain and sprocket.

COMBINED SHOVEL AND HOE (Fig. 10)—The blade of this tool is pivoted to the handle and is readily secured by a latch in either of two positions, practically at right angle to each other, being used as a shovel in one position and as a hoe in the other.

FIG. 2

FIG. 4

FIG. 6

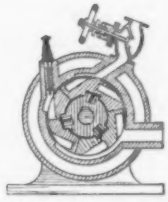


FIG. 8

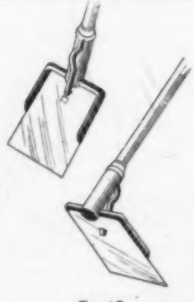


FIG. 10

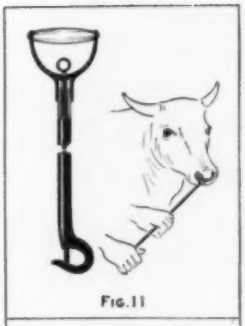


FIG. 11

DEVICE FOR LEADING DANGEROUS BULL (Fig. 11)—The body of this "lead" is a metal tube, 4 ft. in length, provided with a handle on one end and a hook on the other. Inside the tube is a rod, which is pressed against the inner side of the hook by a spring, but is easily released by a pull on the ring at the opposite end of the rod. The user simply stands at a safe distance and clamps the device over the sensitive central wall of the bull's nose. In case of necessity it can be used effectively as a club.

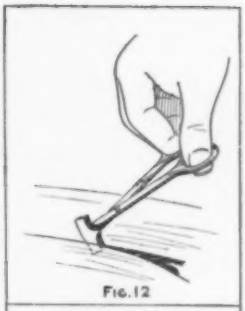


FIG. 12

SHEARS FOR RIPPING SEAMS (Fig. 12)—This device works after the fashion of ordinary shears. The blades have vertical cutting edges and project in opposite directions from the arms, the seam being spread and the threads cut at one operation.

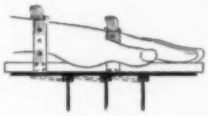


FIG. 13

SWIMMING DEVICE (Fig. 13)—This device, apparently designed as an aid to inexperienced swimmers, consists of a block which is strapped to the hand and on which is carried a number of hinged wings. These wings lie flat against the block during the forward reach, but spread out and engage the water during the propelling stroke.

FIG. 14

APPARATUS FOR SPREADING OIL ON THE SEA (Fig. 14; British patent to a German)—The purpose of this invention is the calming of the sea in the lee of a vessel so that boats can be launched safely. A number of floating oil-distributing tanks are attached to a cable, and the ends of this cable are connected by other cables to the bow and stern of the ship. A board forming the junction of the cables at each end is placed at such an angle that the apparatus spreads out in a curved line under the action of the wind and waves, scattering oil over a wide area.

FIG. 15

BOOK HOLDER FOR RECLINING READER (Fig. 15)—This device has a glass panel carried in an adjustable frame, which in turn is supported by a rod attached to the side of the bed. The book is laid face downward on the glass panel, and may then be comfortably read by a reclining reader.

FIG. 16

SAFE-DEPOSIT SHOE HEEL (Fig. 16)—This curious invention is intended to enable the user to carry valuables in the safest possible way. The receptacle in the heel of the shoe can be reached only from the top. It is closed by a metal disk over which a thin inner sole is laid.

FIG. 17

NOSE-BAG SUPPORT (Fig. 17)—The interesting features of this device are the brace that runs to the lower part of the hames, and the flexible support attached to the top of the hames. The invention is intended to enable the horse to eat from the bottom of the bag without being compelled to brace it against the sidewalk or other solid object.

FIG. 18

AUTOMATIC GAS CUT-OFF (Fig. 18)—The valve that supplies the burner is so designed that it shuts off the gas in case the light is accidentally extinguished, being controlled by a spring that keeps it normally closed. When the gas is turned on a pivoted lever engages a ratchet on the valve and holds it open. The other end of this lever is connected with a metal bar having a high coefficient of expansion and placed in position to be heated by the flame. When the flame is extinguished, the bar contracts and draws the lever out of engagement with the ratchet. The spring then closes the valve, shutting off the gas.

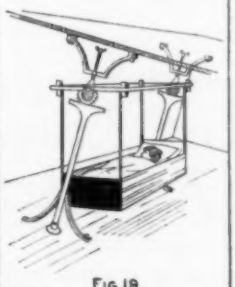


FIG. 19

SELF-LEVELING BUNK FOR SHIPS (Fig. 19; American patent to an English woman)—The bunk is suspended in such a way as to remain practically level regardless of the rolling of the ship. The frame is supported by a toothed rack and sector, while a restraining spring prevents too great a movement.

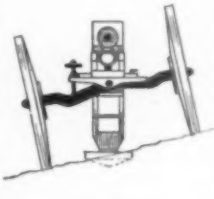
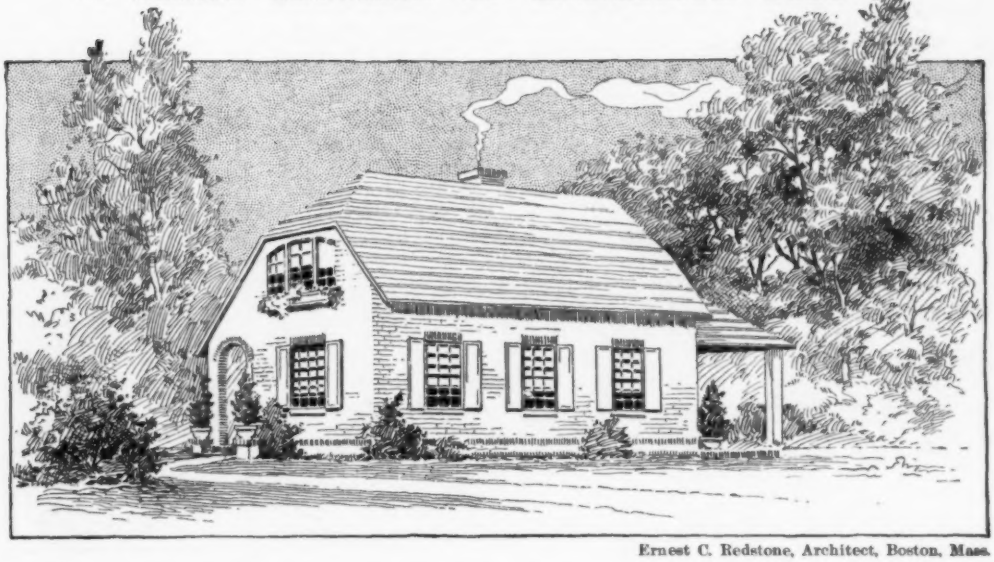


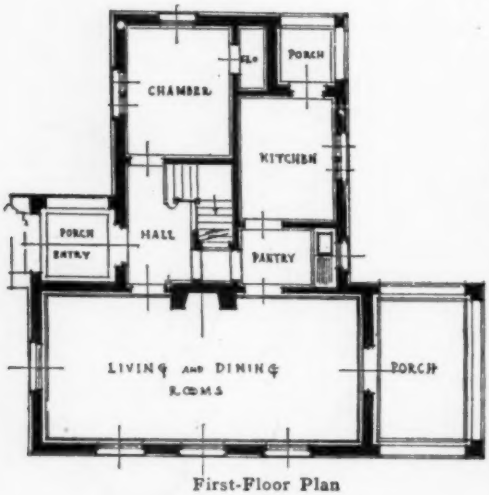
FIG. 20

GUN CARRIAGE THAT LEVELS FIELD GUN (Fig. 20; German patent)—The purpose of this apparatus is the placing of the gun in a horizontal position when it is being fired from a hill side. The axle is made in two pieces that are joined together by a pivot at the center. The gun is leveled by tilting the axles with reference to each other by means of a screw jack, as shown.

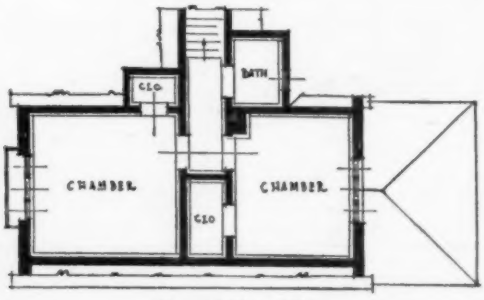
A BRICK COTTAGE OF MODERATE COST



Ernest C. Redstone, Architect, Boston, Mass.



First-Floor Plan



Second-Floor Plan

This attractive dwelling, in which the best of material was used throughout, was built at a cost of only $3,500. It is 28 ft. wide and 36 ft. long, and seems well adapted to a lot as small as 50 by 100 ft. A cellar with a ceiling height of 7½ ft., which provides ample space for storage, furnace, coal, and cold room with preserve closet, extends under the entire rear portion of the house, the space under the living and dining room being unexcavated. The outer walls are built of full-range red "texture" brick, laid with a cream-colored ½-in. rough-cut joint. Owing to the rough surface of these brick, they do not reflect the light, and the result is an unusual softness and delicacy of tone.

An interesting feature of the first floor is the combination living and dining room, which extends the full width of the building. The dining room can be screened off if desired, while the arrangement makes an unusually large room available for special occasions. In addition to this room, the first floor contains the kitchen, pantry, entrance hall and an 8½ by 11-ft. chamber, the latter being provided with ample closet room. The stairway to the basement is in the entrance hall under the main stairway. A distinctive feature of the living and dining room is the fireplace, built of "texture" brick similar to those used in the outer walls. The second floor contains the bathroom and two chambers. One of the chambers is 10 by 11½ ft. and the other 12 by 12 ft., and each is provided with a large closet. The ceiling height is 8 feet.

The floors in the living and dining room and in the entrance hall are of hard wood, while the walls are of plaster, rough-floated and tinted. The remainder of the building has pine floors and plastering of a hard white finish. The interior finish is cypress, stained brown.

Courtesy Illus. London News

An Ingenious Contrivance Which Records the Movements and Pressures Exerted in Walking and in Golfing

NEW MACHINE RECORDS THE STEPS IN WALKING

The mechanics of the muscular effort used in walking, in golfing, or in playing other games may be recorded with exactness by means of a new device to which the inventor has given the name "kinograph." It consists of a system of levers connected with a recording pencil in such a way that a step upon a movable platform is registered on a strip of paper, which is propelled by clockwork. The difference of the step in walking and in running is marked, and the swing of a golf player makes distinctive impressions. The individualities of each pedestrian may be clearly noted by a study of his records as made by this machine.

¶Prizes of $10,000 are offered by the Panama-Pacific Exposition for a motorboat race from New York to San Francisco by way of the Panama Canal.

SOME CURIOUS FASHIONS IN FEMININE HOSIERY

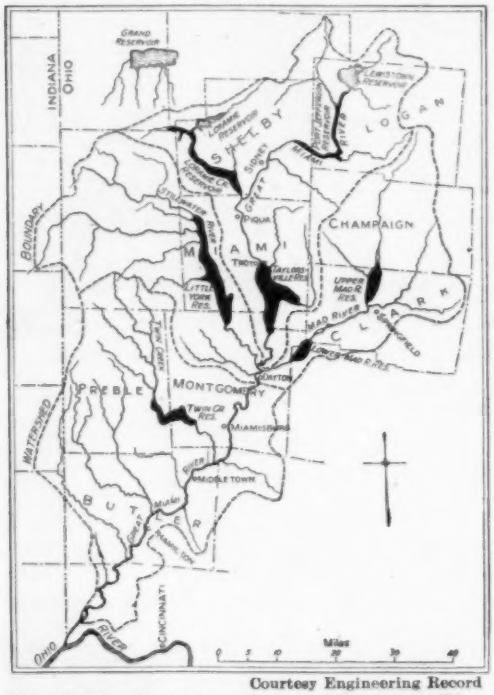
With the advent of the slit skirt fashion is beginning to pay even more attention to the details of feminine hosiery. Two of the latest Parisian

Two Recent French Suggestions in Hosiery

suggestions in this line are reproduced herewith. One is a spiral band of fur encircling the leg from the ankle to the calf; the other a jeweled purse or cigarette case attached to a broad garter.

TO PREVENT REPETITION OF MIAMI RIVER FLOOD

For protecting the Miami River valley in Ohio from future floods such as that by which it was devastated in the spring of 1913, a complete system of "dry" reservoirs has been planned, enabling legislation has been passed by the Ohio legislature, and the work of actual construction only awaits the necessary court hearings for determining relative benefits and damages to individual property holders. The work, as planned, is estimated to cost $12,000,000. Great areas of farm land as well as eight cities of Ohio, having an aggregate population of about 200,000, will be protected by the system of reservoirs. The property valuation of the protected district is estimated at $250,000,000.



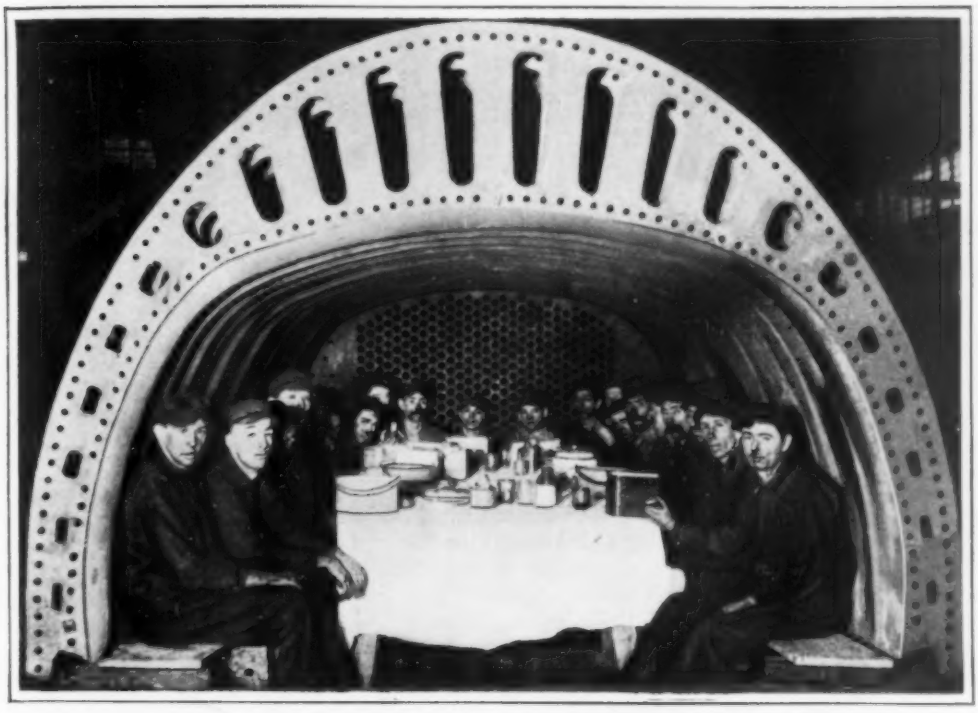
Courtesy Engineering Record

Map Showing Location of Proposed Reservoirs That will Hold Back the Flood Waters of the Miami River Watershed in Ohio and Prevent a Repetition of the Flood That Devastated That Valley in the Spring of 1913

The fundamental idea of the dry-reservoir plan is to impound the excess waters of a flood and retard the flow until the crest of the high water has passed. From careful surveys and computations made by the engineers it is found that about 55,000,000,000 cu. ft. of water fell over the Miami basin above Dayton during the five-day storm of March, 1913. A system of six or seven dams has been planned with a sufficient capacity to hold back 40,000,000,000 cu. ft. These dams will be built of earth, will be from 40 to 70 ft. high, and will be placed across the valley from hill to hill in suitable locations. Reinforced-concrete tunnels, large enough to allow the normal flow of the river to pass through, will be placed through the bottom of each tunnel. These tunnels will be kept open at all times, and when the water coming in from the upstream side of the dam exceeds the normal flow of the river, the excess will be held back by the dam. When the supply is reduced the reservoir will empty automatically. To prevent the destruction of the dams in case of unprecedented floods, each will be provided with a spillway to relieve the dam of some of the surplus. The carrying capacity of the river channel is estimated at 8,000,000,000 cu. ft. per day, so that the system will afford ample protection during a heavier storm than that of last year. An expert has estimated that approximately 280,000,000,000 cu. ft. of water, or enough to have raised Lake Erie with its 10,000-square-mile area a height of 4 ft., fell in Ohio and Indiana during this storm.

TWENTY MEN DINE IN HUGE LOCOMOTIVE FIREBOX

The Philadelphia and Reading Railway has recently added a number of large locomotives designed for burning anthracite coal, necessitating large grate area. In one of these huge fireboxes, during the process of construc-



A New Kind of Dining Room Used by Railroad Employes

tion and before the door had been put in, 20 employes sat down at an improvised table for dinner. The firebox is made up of 15 channel-shaped sections, each 10 in. wide. The inside dimensions of the curious dining room are 13 ft. 2 in. in length, 8 ft. 8 in. in width, and 5 ft. 1 in. in height at the center.

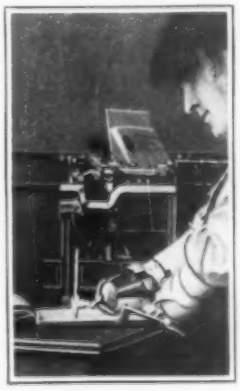
AUTOMATIC-CLOSING JAWS MARK NEW TWEEZER

Jewelers and watchmakers are using a new tweezer which holds roll pins, watch jewels and stones firmly when picking them from a flat surface. The automatic-closing jaws grasp whole jewels while gauging or trying on a pivot or lock, and the article does not fall out when the tweezers are laid down. The device is patented.

¶A class of 34 girls and 21 boys in the Bloomington, Ind., High School has taken up automobile engineering.

TWO INVENTIONS TO ASSIST THE ARMLESS TO WRITE

The loss of both arms below the elbow proved no obstacle to a courageous young stenographer, who demanded that a typewriter be provided for her use. Such changes in the arrangement of a standard machine were made as would allow her to insert the paper, manage the line-spacing mechanism, the two-color dial and the carriage return by simple pressure on padded levers. The shift key was adjusted so that it could be worked by the knee. Then two devices were made to be attached to her arms, one of which held a lead pencil



while the other was equipped with a rubber hammer for striking the keys of the typewriter. With courage and patience she set about to master the new implements and has succeeded so well that instead of facing the world a helpless cripple she is able to earn her living.

PORCHES ADD TO ATTRACTIVENESS OF BUNGALOWS

By ALBERT MARPLE

The two features brought from India which make the bungalow particularly pleasing are the porches and the overhanging roof, and of these the porches are susceptible of the widest individual treatment. Southern California is famous for its brilliant sunshine and equable temperature, making the bungalow an ideal form of residence, and the porches designed by the architects of that state show an advance over those of other localities in modern adaptation to local conditions. In the construction of these distinctive porches cement and concrete play important parts. Possibly this is largely because the light color of the concrete blends so well with the remaining portions of the low dwellings, where darker colors usually prevail.

Carrying the heavy timbered effect from the roof and eaves over onto concrete pillars is the usual form of handling these verandas, which may trail off in pergolas or even simple unshaded platforms. The pillars are sometimes mere piers of concrete, offering no support to the roof of the porch, and the piers are often linked together with heavy chains. In one case, low

These Porch Pillars Have Concrete Bases

A Fine Example of the Arch Effect in Porches

A Massive, Yet Not Unattractive, Effect

Nine Arches Admit Light to the Bungalow on the Left

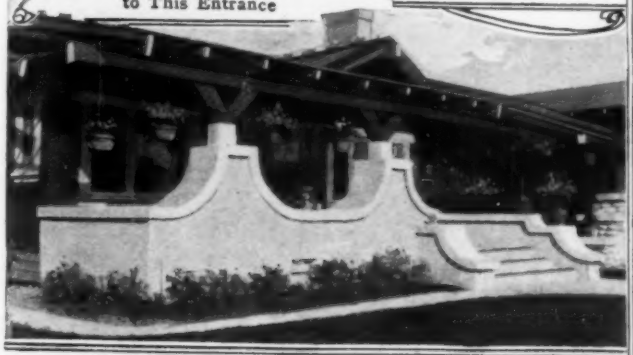
A Simple Pergola Style

Posts and Chains Make a Pleasing Railing for This Veranda

Pillars and Wall Built Up of Concrete Blocks

The Winding Steps Add Grace to This Entrance

Here the Introduction of Curved Lines Lends Variety



Wood and Concrete Combined in Ornate Forms Support a Wide Roof

Roof Beams Run through Massive Concrete Pillars

concrete pillars support wooden uprights which in turn bear up the roof, while chains connect the pillars, forming protective barriers along the sides of the porch.

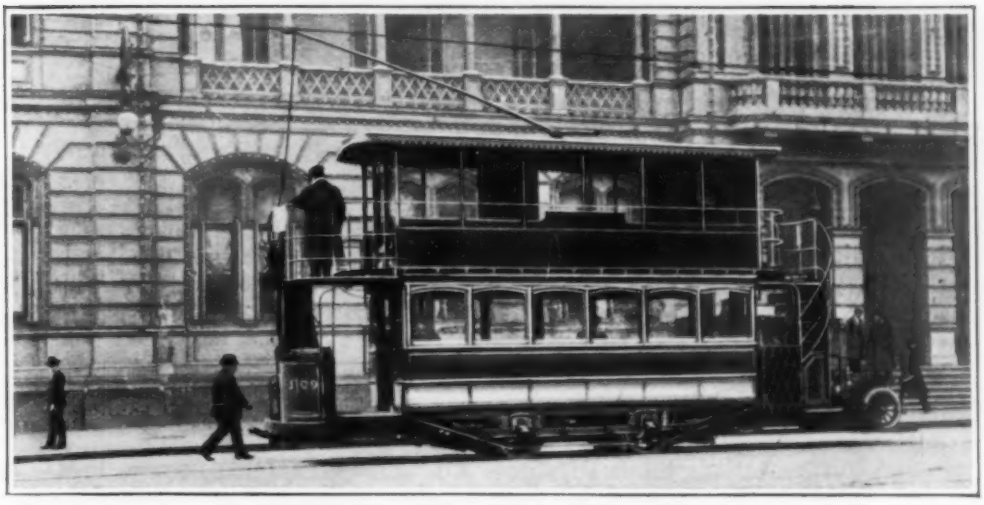
The porch with the arch effect is proving the choice of many home builders. This porch, which is shown in two accompanying pictures, consists of nine arches, and runs around three sides of the bungalow. The walls are a foot thick and are finished rough, while the floor and the steps are smooth. The photograph taken along the interior of the porch indicates the pretty effect secured when looking through the arches into the adjacent street. This type of structure may also be secured in cement-block construction, in which the exterior gives the appearance of genuine stone and the band about the top is finished smooth.

The walls, railings and pillars of some handsome porches are of solid concrete, and in some rare instances a sloping effect is given which adds greatly to the beauty of the little dwelling. Another interesting and effective form is that in which the heavy beams supporting the roof are allowed to run through the tops of the pillars which form the corners of the porch. These piers and the sides of the porch have been given a rough sanded finish, while the smooth floor and cap are further contrasted by using a darker shade in mixing the concrete of which they are composed.

HUNTING FOR THE PERFECT HORSESHOE

The Roads Improvement Association of England offered a prize of $500 for an ideal horseshoe, and 800 shoes were submitted for the competition. They were arranged on long tables, each appropriately marked for judging. Many curious shapes were represented, and some extremely ingenious features displayed. The matter of judging this competition was of no small difficulty, both the practical and theoretical values having attention, for obviously the shoe which might be ideal for a heavy draft horse would scarcely be recommended for the light roadster.

800 Different Kinds of Horseshoes Submitted in Competition for a $500 Prize



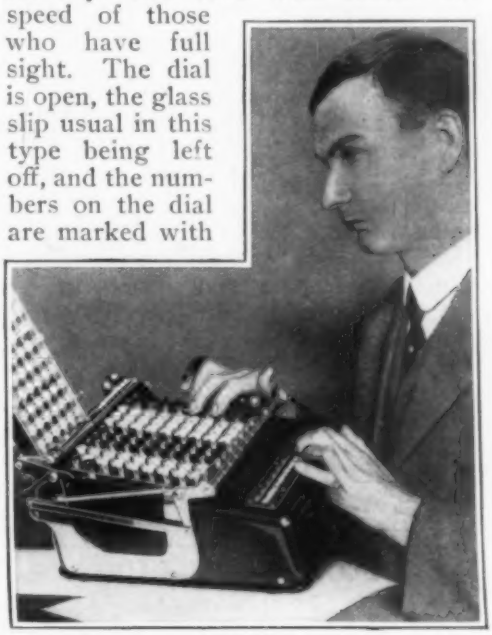
A Curious Type of Street Car Seen in Buenos Aires

DOUBLE-DECKED TROLLEY ON BUENOS AIRES STREETS

The capital of Argentina has excellent street-car facilities, the most recent addition to which is a double-decked trolley car quite surpassing in its completeness those more or less common street vehicles having seats on top. The Buenos Aires double-deckers are really two cars, one on top of the other, the upper car as fully equipped in its fittings as the lower. The streets of Buenos Aires being rather narrow, the rails are necessarily close to the curb, the edge of the street car just grazing the elbows of pedestrians in many cases, and the double-decked cars appear huge as they sweep past.

NEW COMPUTING MACHINE FOR THE BLIND

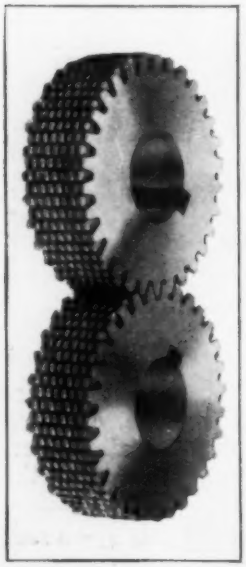
A machine which will serve to develop the mathematical sense of those who have lost their sight has been invented by a Los Angeles man, himself sightless, who hopes to make other unfortunates of some use in the business world. The machine which has only recently been completed, differs but slightly from the adding and computing machines in common use in most business offices. The keys are alternately flat and concave, enabling the operator to distinguish the different keys and work with almost the speed of those who have full sight. The dial is open, the glass slip usual in this type being left off, and the numbers on the dial are marked with raised patterns such as are used in the Braille system for the blind. By such marking the blind operator can easily read the result of the addition or computation.



Recent Invention of Blind Man to Help His Fellows

LAMINATED GEARS WITH STAGGERED TEETH

The quest for silent gears in automobile construction has evolved a new type which can be made in any metal, from brass to high-tension steel, and the transmission efficiency of which equals the highest grade of cut gears. Instead of taking a solid block of steel and cutting teeth in it by means of a milling machine, plates of steel or other suitable metal are punched with teeth on their rims. These plates are then clamped in a frame, and the edges of the teeth heat-treated or casehardened. These plates or disks are then ready to be built up into a gear wheel, the teeth being staggered and the laminations separated by means of very thin disks or washers, which leaves a clearance for the teeth without friction. Not only are these new-type gear wheels remarkably strong, but the "ring," or hum, is entirely eliminated. Should any wear be observed on any particular plate, the disk may easily be removed and another inserted.



DISAPPEARING AIRSHIP SHEDS FOR HELGOLAND

The island of Helgoland, situated in the North Sea off the coast of Germany, is being rapidly made into a strong naval base by the German government, and an interesting feature in this development is the means used for making the air-craft fleet a strong and efficient auxiliary to the navy. A novel installation now being planned is a revolving and disappearing airship shed. The shed turns on a pivot so that an airship can always enter and leave it with the wind, and it will be equipped with hydraulic machinery by which it can be quickly lowered into a concrete trench and made invisible from the sea and safe from gun fire. Many sheds for aeroplanes have already been built in concealed positions on the island.

HUNTING FOR BOOKWORMS IN PUBLIC LIBRARY

The New York Public Library, which now contains about 8,000,000 books, is being constantly augmented by additions from libraries, given by will, of rare old editions, and valuable books from the very ends of the earth. To preserve these intact, and to guard against the ravages of bookworms and other insects, which feed upon the paper, the glue on the backs and the cloth and leather bindings, a constant care is exercised, and a keen watch kept for any evidence of their activities. One woman is assigned exclusively to this work. When treating the books, she wears a huge apron which completely covers her gown. A cheesecloth veil protects her face against the germs which lurk in the musty documents, and even the air she breathes is screened against contagion. Close touch is kept with the Health Department, and books which have been returned from infected areas are fumigated before being restored to circulation. The frequent use of the vacuum cleaner is a great aid in keeping the books free from dust and germs.

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RADIATORS OF GLAZED PORCELAIN

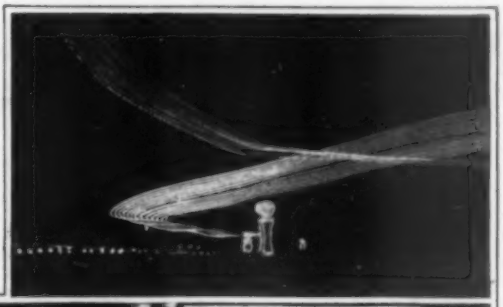
Cast-iron radiators, against which many objections have been urged, may give way to those made of glazed porcelain, which radiate a greater percentage of heat, retaining their heat for a considerable period after the steam is turned off, and are far more easily cleaned. The new type of steam-heating unit was exhibited at a building exhibition recently held in Leipzig, Germany. In form these new heating elements differed little from their cast-iron prototypes, although they necessarily had thicker walls, but from a sanitary and hygienic standpoint they are said to be preferable to those made of cast iron.

¶The Manchester Ship Canal carried 5,780,000 tons of toll-paying freight during the year 1913.

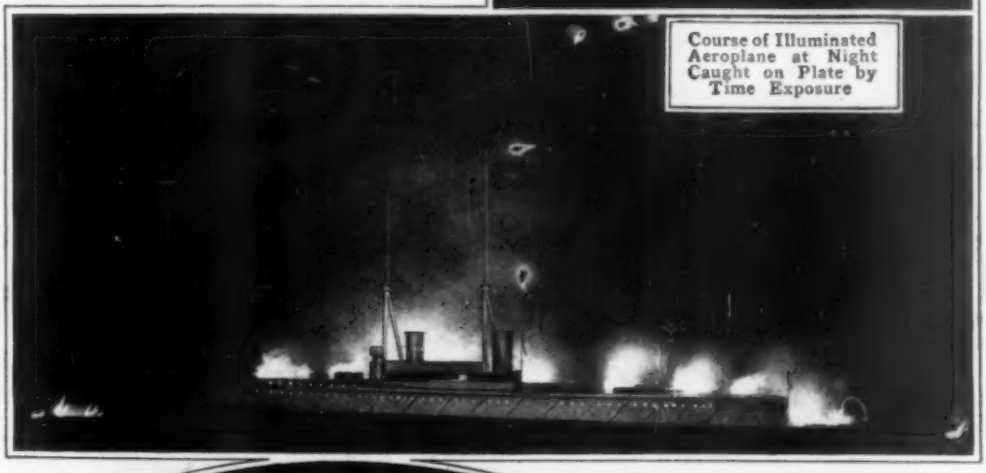
ILLUMINATED AEROPLANES IN NIGHT FLIGHTS

Highly spectacular effects were produced by some recent experiments in flying illuminated aeroplanes at night, in England. Three aeroplanes were provided with electric lights, the bulbs being spaced about the edges of the planes in such a way that when the machines traveled through the air the effect was that of parallel streaks of light. An interesting feature of the display was the destruction of a dummy battleship by bombs dropped by the airmen, demonstrating how a night attack on a naval force might be carried out.

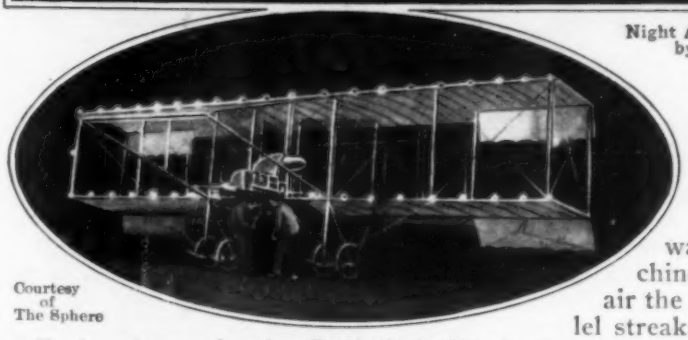
The whole exhibition suggests interesting possibilities for future fireworks displays.



Course of Illuminated Aeroplane at Night Caught on Plate by Time Exposure



Night Attack on Dummy Battleship by Illuminated Aeroplane

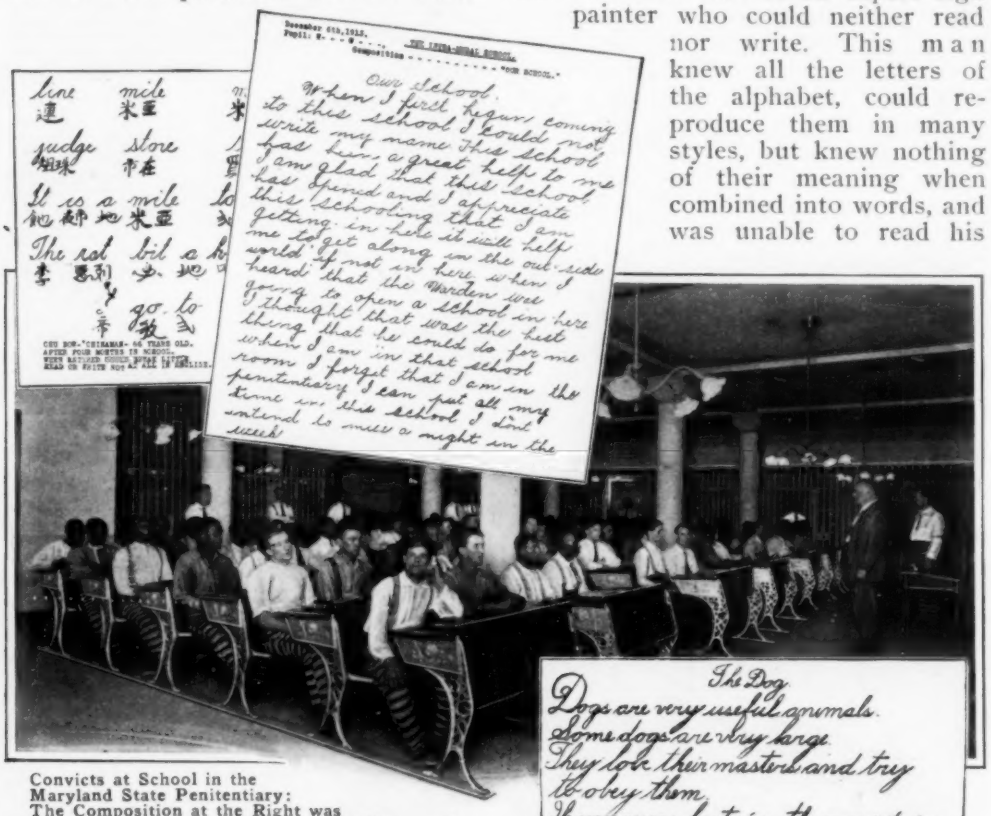


Courtesy of The Sphere

Aeroplane Equipped with Electric Lights for Night Flight

WHAT EDUCATION DOES FOR THE CONVICT

The school for convicts at the Maryland state penitentiary, known as the "Intra-Mural School," is a striking demonstration of the modern idea that reform of the convict through education is more profitable for the state


Our School.
When I first began coming to this school I could not write my name this school has been a great help to me I am glad that this school has opened and I appreciate this schooling that I am getting in here it will help me to get along on the outside world. If not in here when I heard that the Warden was going to open a school in here I thought that was the best thing that he could do for me when I am in that school room I forget that I am in the penitentiary I can put all my time in this school I dont intend to miss a night in the
The Dog
Dogs are very useful animals.
Some dogs are very large.
They love their masters and try to obey them.
If you were lost in the mountains they would take you to their masters.
These dogs are of the St. Bernard family.
One of these dogs saved the lives of forty people.

Convicts at School in the Maryland State Penitentiary: The Composition at the Right was Written by an Expert Sign Painter Who could not Read His Own Signs When Sent to Prison

and better for the individual criminal than is the vindictive and unintelligent treatment of prisoners formerly in vogue. The Intra-Mural School has been in existence less than two years, but the results have been such as to astonish even the founders of the school. Much of its success is attributed to the employment of educated convicts in the actual conduct of the school work, as a convict is better able than an outsider to understand the peculiar mental habits induced by prison life.

One of the greatest difficulties, particularly at the start, was to get illiterates to undertake the work voluntarily, their objection being due in most cases to a feeling of hopelessness, to which was often added a sense of shame and a disposition to hide their illiteracy. A peculiar case of this kind was that of an expert sign painter who could neither read nor write. This man knew all the letters of the alphabet, could reproduce them in many styles, but knew nothing of their meaning when combined into words, and was unable to read his own signs after he had painted them. He attempted to hide his illiteracy by borrowing magazines and pretending to read them, and nearly succeeded with the aid of this ruse and through being able to sign his own name. When the deception was discovered he was induced to enter the school.

When he is discharged, there is little doubt that this man will be not only a better sign painter but a better citizen. Another case was that of an illiterate Italian, who, when asked to enter the school, refused on the ground that since he could not read nor write his own language, it would be foolish to try to learn to read and write English. He was finally induced to make the attempt, but only as a matter of personal loyalty to the warden. This man is now one of the most diligent students in the school, and particularly prizes his ability to write letters to his family and to read, without any help, the letters he receives from home. These cases are typical of many in which the convicts are having their whole outlook on life broadened by the work of the school. The first thing the average convict wants to do after learning to write is to write letters to his family, and the prison authorities encourage this, as it has been found that letters from home furnish the greatest impetus to further study and are an important aid in the work of reform. The school work is given in three grades, the first of which is for convicts that are entirely illiterate. But after these grades are passed the work does not stop, an institutional correspondence school being maintained for the more advanced students.

Prison atmosphere is kept entirely out of the school, each convict being made to feel, for the time being, that he is not in prison at all, but at school. Only one guard is ever stationed in the schoolroom, and he is given as inconspicuous a place as possible. During the entire time that the school has been in operation the guard has never had any duty to perform, as there has never been a case of disorder or trouble in the schoolroom.

¶Transatlantic wireless service at the rate of 5 cents a word is promised when the Poulsen system is in operation this summer between Denmark and Canada by way of Ballybunion, Ireland.

A MICROSCOPIC FORTUNE: $25,000 IN RADIUM

Most people are familiar with the three-grain tablet or three-grain capsule of quinine. But quinine, powdery, fluffy stuff, is extremely light. Radium, on the other hand, is extremely heavy; so heavy, in fact, that three grains of this most precious metal, which is worth $25,000, consists of but a few specks, almost microscopic. This little fortune, incased in a container of lead, is scarcely larger than a one-grain capsule of quinine, and, though it may be held between the thumb and finger, represents a greater value than the life savings of many an industrious man.

INFERNAL MACHINE PROVES TO BE RIVER GAUGE

Considerable uneasiness was caused in a city of Southern California when a device consisting of a clock mechanism attached to a brass cylinder and thought to be an infernal machine was discovered in the debris brought down by the flood of last February. After this supposedly dangerous instrument had been turned over to the government for investigation it was found to be the automatic river gauge that had been keeping the record of the rise and fall of King's River for 11 years for the United States Geological Survey.

THIS HORSE WEARS GOGGLES WHILE WORKING

A horse which is constantly employed in a California factory, where

Chemical Fumes are Prevented from Injuring Horse's Eyes by Curious Goggles

fumes irritate the eyes, is equipped with goggles. A leather mask fits over the head and ears and holds the glass pieces firmly in place, keeping the chemical fumes from attacking the delicate membranes. Of course, not the horse only, but the driver and other employes whose work brings them in contact with the noxious gas find protection in goggles of similar construction.

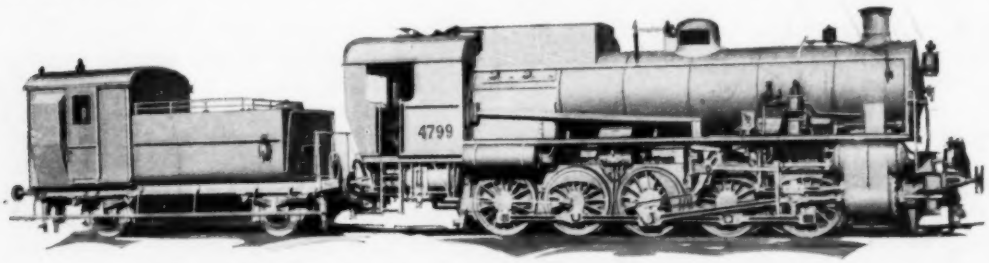
¶Many kinds of dyes are now made from sawdust.

FLAMELESS COMBUSTION TO PRODUCE HEAT

Flameless combustion of gas for the purpose of producing heat in usable form is made possible by a burner that has been patented by a Chicago inventor. The purpose of the invention is to obtain the highest possible temperature from the combustion of a mixture of gas and air without the danger of backfire or explosion that accompanies such combustion in a flame. The construction of the burner allows the current of gaseous mixture, flowing with great velocity, to pass through heated tubes made of a substance such as a combination of thorium and uranium oxides, which becomes incandescent through contact with the gas mixture, and gives off intense heat without flame.

NOVEL LOCOMOTIVE USED IN ALPS AND APENNINES

Freight locomotives of novel design are in use on the Italian State Railways for handling traffic through the Alps and the Apennines, where continuous grades having a rise of 1 ft. in 38½ ft. are common. These locomotives are balanced compounds with 10 wheels, all of which are drivers, and they are therefore capable of exerting an enormous tractive force. The most unusual feature of the design is the placing of the coal bunker, with a capacity of 4 tons, on top of the boiler just forward of the cab. The tender, aside from having a brake compartment, is used only for carrying water, and can be coupled to the front or the rear of the locomotive as required.



Powerful Italian Locomotive with Coal Bunker Carried on Top of Boiler

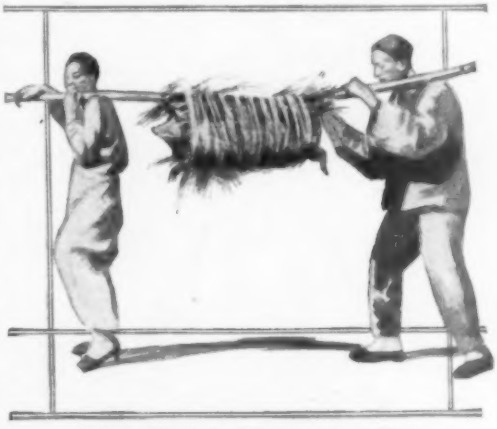
Downstream Side of Dam, Showing Removable Beams and Parabolic Concrete Crest

CONCRETE BEAMS FORM FACES OF NEW DAM

A novel type of construction was adopted for the concrete dam that has just been built across the Mississippi River between St. Paul and Minneapolis. Both faces of the dam, instead of being cast solid, are made of beams cast separately and bolted down after being placed in position on the solid-concrete supports. Each concrete beam is 16 ft. long, and on the downstream side, where eight beams are used, they are 18 in. thick. On the upstream side 19 beams, varying in thickness from 33 in. at the base of the dam to 29 in. at the top, are used. Each beam weighs about 5 tons and has bolt loops secured to the concrete at each end. The joints between beams are tightly filled, making the dam waterproof. The crest of the dam is parabolic in form and is of concrete cast in place on the concrete supports. One of the evident advantages of this construction is the ease with which a damaged beam may be removed and replaced without disturbing adjacent portions of the dam.

HOW THEY TRANSPORT PIGS IN CHINA

The philosophical Chinese long ago learned that the hardest way to change a pig's location is to drive it. In a land where fences are unknown, where low hedges separate fields of rice, a pig



Chinese Method of Transporting Hogs

on freedom bent will do an immense amount of damage when pursued at top speed by shrieking coolies. So a national custom grew up of tying the

pig to a long pole, covering it with wrappings of straw and marsh grass and carrying it bodily between two bearers. To this procedure the pig makes no objection, and the movement of stock goes on in peace and quietness. Whether the pig is to be taken from one pen to another, or to market ten miles away, no other method of transportation is thought of.

¶The Republic of Panama is planning, on the opening of the canal, to make Colon and Panama City free ports of entry for the merchandise of all the world, and to construct great storage warehouses on the isthmus.

USING MOTORCYCLE AS A HOISTING ENGINE

Of the many uses to which a motorcycle can be put, that of using it as a hoisting engine is probably the most novel. An Australian farmer who was building a barn first hauled all his material from the railway station in a trailer pulled by his American-made motorcycle. There is nothing new about this, as motorcycles have been used as traction engines before. But when the barn was completed there still remained a 400-gal. steel water tank to be lifted to the roof. As there was no winch or suitable block-and-tackle equipment to be had, getting this tank into place looked like a difficult problem. Then the motorcycle was brought into use. Two poles with a crossbar at the top, a pulley and a strong rope were obtained and erected, and with the power furnished by the motorcycle the tank was easily lifted to its place on the roof.

AUSTRIAN ARMY ADOPTS PNEUMATIC PONTOONS

Air bags carried by an advance force of the Austrian army are used for boats and floats to cross rivers and prepare bridges for following columns. The bags, made of waterproof canvas, are some 5 ft. in length and half as wide, and are rolled up when not

Austrian Soldiers Preparing Pneumatic Pontoons by Inflating Waterproof Bags

Using the Air Bags as a Substitute for a Boat

Knee-Braced Concrete Columns Support Highway Bridge

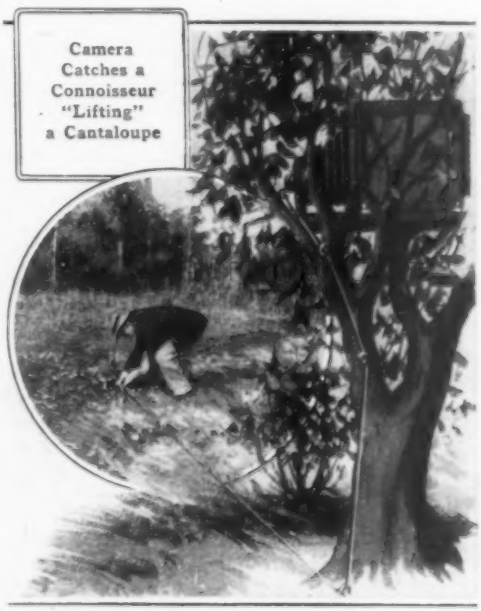
in use. On approaching a river the force unrolls the bags, inflates them by simply blowing them full of air, and seals the orifice with an air-tight clamp. A plank, 10 or 12 ft. long, is lashed to two bags and this improvised boat or float will support several men. When spaced at the right intervals, these bags form pontoons for the support of a temporary bridge.

NOVEL BRIDGE PIERS ON ST. CROIX RIVER

The reinforced-concrete column bridge which crosses the St. Croix River at Hudson, Wis., has recently been completed and presents some interesting features. It is a highway bridge, the riveted span trusses being supported on pairs of knee-braced, reinforced-concrete columns, each from 4 to 5 ft. in diameter and varying up to 60 ft. in height. The piers on which these columns are supported are 8 ft. in diameter and 12 ft. high, extending down about 7 ft. below the top of the foundation piles. The bridge is 1,016 ft. long, with a roadway 18 ft. in the clear, and at its highest point rises 48 ft. above high water. The pier columns were built in wood forms, 14 ft. high, raised without removing them as each part of concrete was laid. The floating mixer was anchored abreast of each column site, and the concrete elevated in towers for dumping into the forms.

CATCHING A THIEF WITH A CAMERA

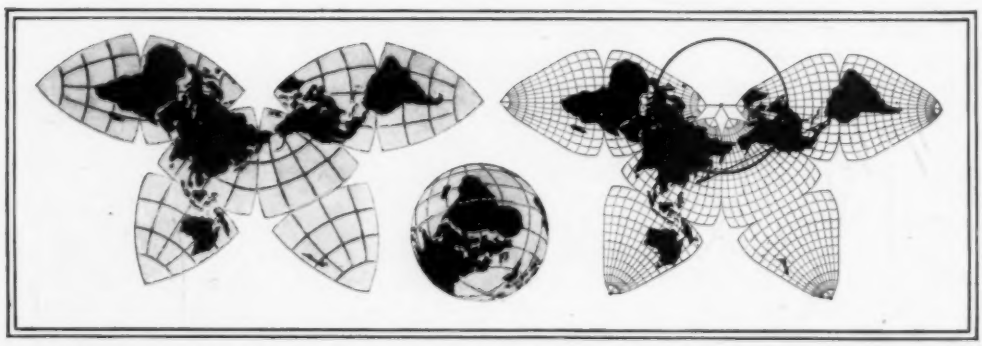
A North Carolina farmer who prided himself upon his cantaloupes found that his finest melons disappeared, but



try as he might, he could get no clue to the thief. Having a photographic camera he hit upon a scheme to discover the responsible party. Concealing the camera in a thicket close at hand, he focused it upon a delicious banana cantaloupe that was just beginning to turn yellow, connecting the stem by a dark cord to the shutter. When he returned to the patch that evening the melon was gone. He hurried the film to the dark room, and upon developing it, recognized the stooping figure as a neighborhood character. All that was necessary was to mail him a post card with his picture upon it, and the ravages stopped short.

NEW METHOD FOR MAKING MAPS OF THE WORLD

If one takes a hollow rubber ball on which the continents are indicated as on a globe, cuts this ball into eight equal pieces, and then spreads these pieces flat under a glass, he has the principle of a new method devised by an American engineer for making world maps. The cuts, of course, must be made at the right points, and the pieces must be assembled in the right way, if the map is to be of practical value as a world map after it is made. The purpose of this new projection is to avoid the extreme distortion that is the objectionable feature in Mercator's and practically every other projection used for representing the surface of the entire globe on a flat sheet of paper. Some distortion is bound to occur when any part of a sphere is laid out flat, but this is so small with the new projection that the paint used in marking the continents on the experimental rubber ball was not even cracked. In dividing the globe for making a world map, one cut is made along the equator, while for the other cuts meridians are chosen that will miss important divisions of the land as nearly as possible. These meridians, of which there are four, are 90° apart and therefore lie on two great circles that intersect each other at right angles at the poles. The first meridian, which is at longitude 22½° west of Greenwich, just misses the east coast of Greenland and passes south through the Atlantic Ocean. The second meridian, longitude 112½° west, runs close to Salt Lake City, Utah. The third meridian, longitude 157½° east, lies mainly in the Pacific Ocean and just misses the east coast of Australia, while the fourth meridian, longitude 67½° east, passes east of the Ural Mountains and south through the Indian Ocean. These eight sections of the globe are then joined together in the manner shown in the accompanying illustrations, in which the heavy circle around the north pole equals the circumference of the globe drawn to the same scale as the sections.



A Rubber Ball Laid Out Flat to Produce a Globular Map of the World on a Plane Surface without Distortion: On the Drawing at the Right the Heavy Circle is the Same Diameter as the Globe, While the Straight Line Equals in Length the Direct "Great-Circle" Route from Panama to Japan